United States Patent [19]

Pugh

[11] **Patent Number: 4,823,762**

[45] **Date of Patent: Apr. 25, 1989**

[54] **ARROW HOLDING AND LOADING DEVICE FOR ARCHERY BOWS**

[76] Inventor: **Gregory E. Pugh,** 13635 Leroy, Southgate, Mich. 48195

[21] Appl. No.: **76,798**

[22] Filed: **Jul. 23, 1987**

[51] **Int. Cl.**[4] **F41B 5/00;** F41B 5/02; F41B 5/06

[52] **U.S. Cl.** ..... **124/52;** 124/23 A; 124/45; 124/53; 124/88; 273/416

[58] **Field of Search** ..... 124/23 R, 23 A, 24 R, 124/24 A, 25, 41 R, 41 A, 41 B, 45, 51 R, 52, 53, 82, 86, 88; 224/916; 273/416

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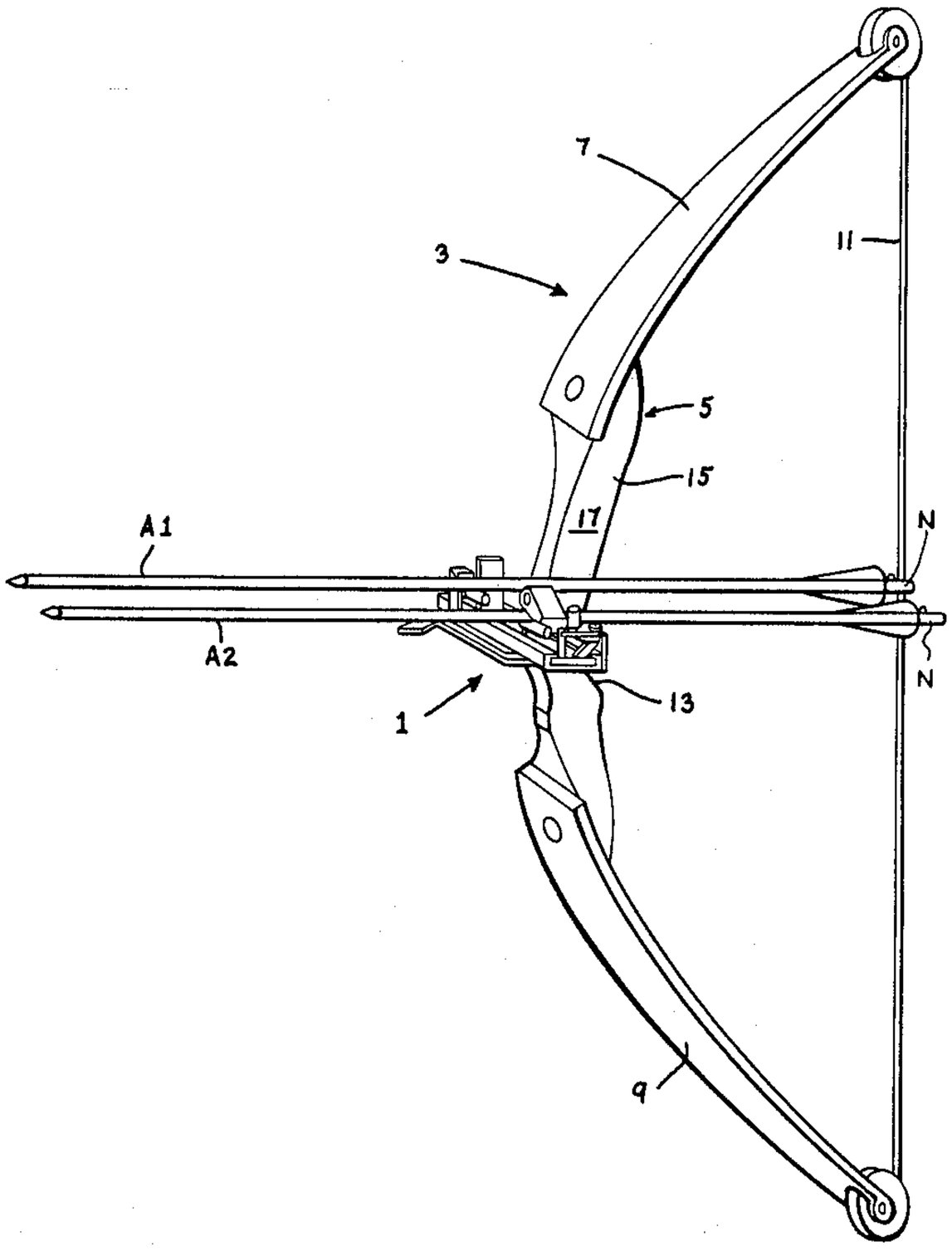
Primary Examiner—Dennis L. Taylor
Assistant Examiner—John A. Ricci
Attorney, Agent, or Firm—Harness, Dickey & Pierce

[57] **ABSTRACT**

An arrow holding and loading device for an archery bow has a frame to be bolted to the bow so that it can support a carriage that moves horizontally from left to right at the front of the bow to automatically shift a follow-up arrow into shooting position upon release by the archer of an initial arrow. A novel arrow nock having one side longer than the other is disclosed and it enables the bow string to be engaged from the side to facilitate rapid shooting.

54 Claims, 12 Drawing Sheets



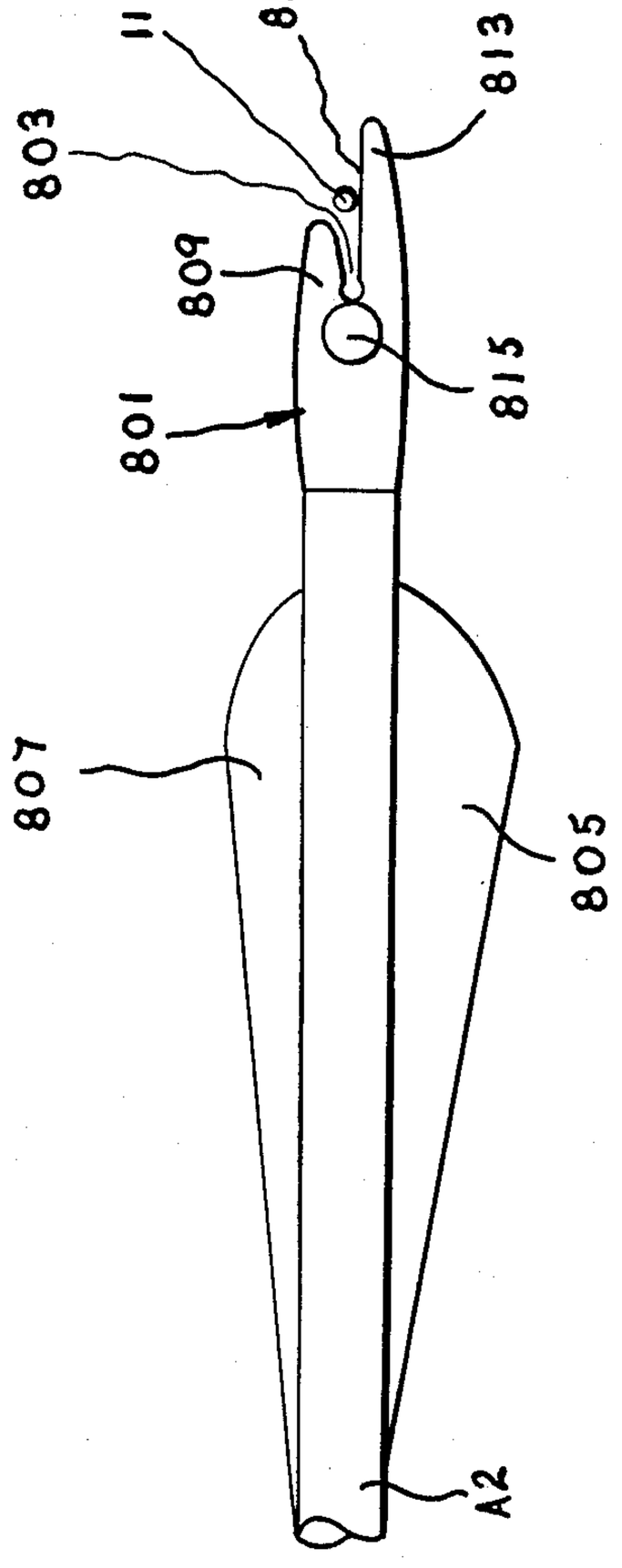


FIG. 1

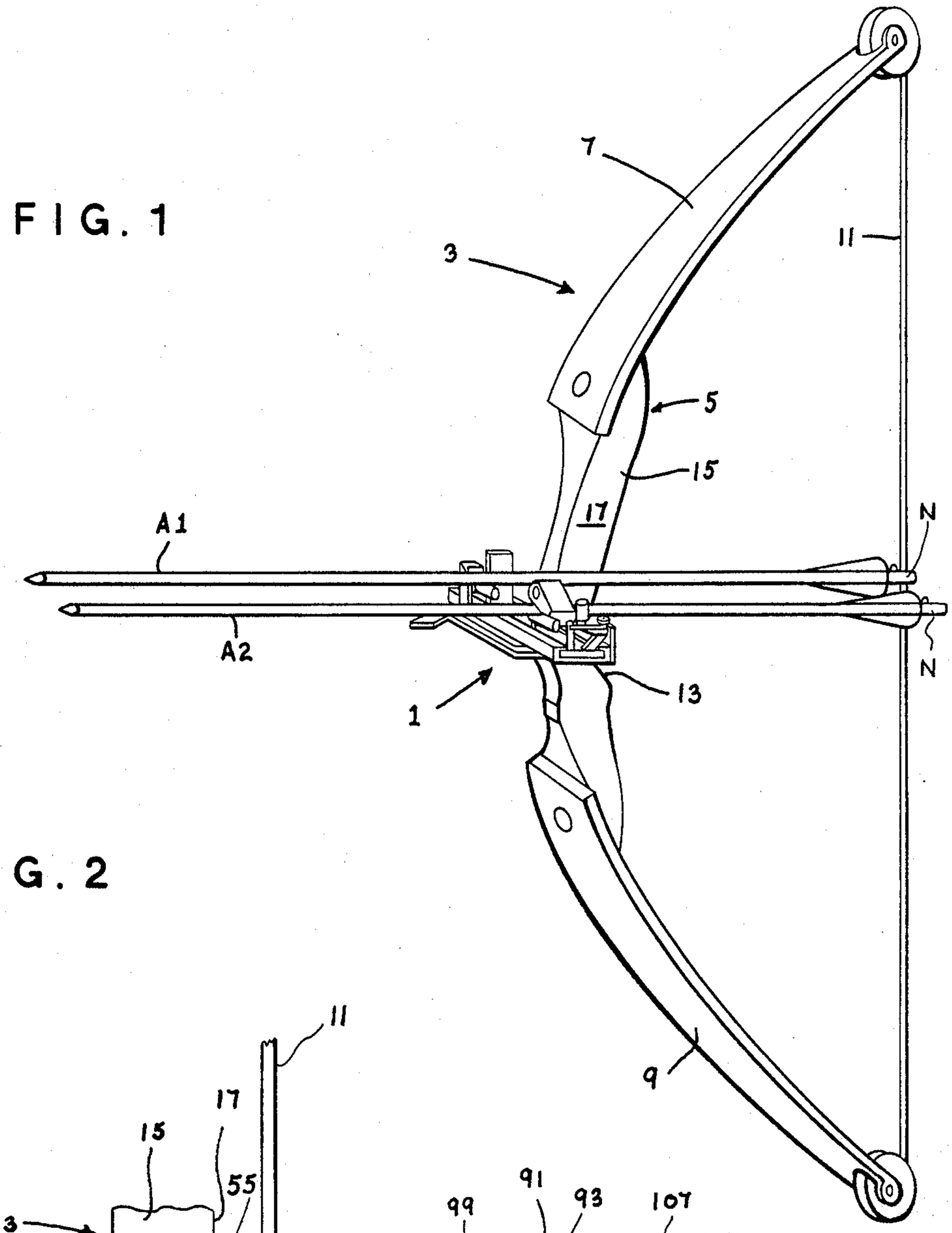

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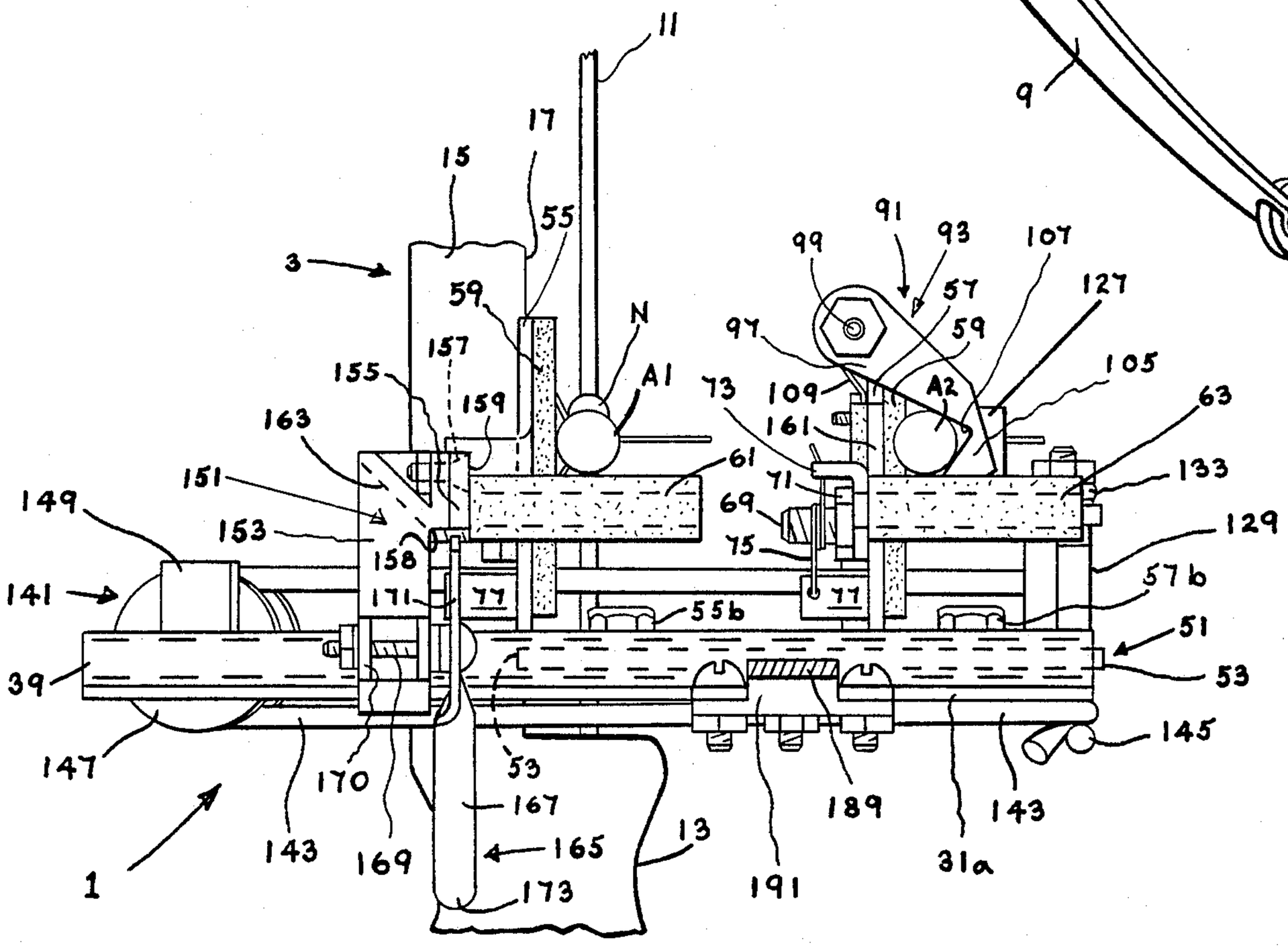
FIG. 2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69
153
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171
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57b
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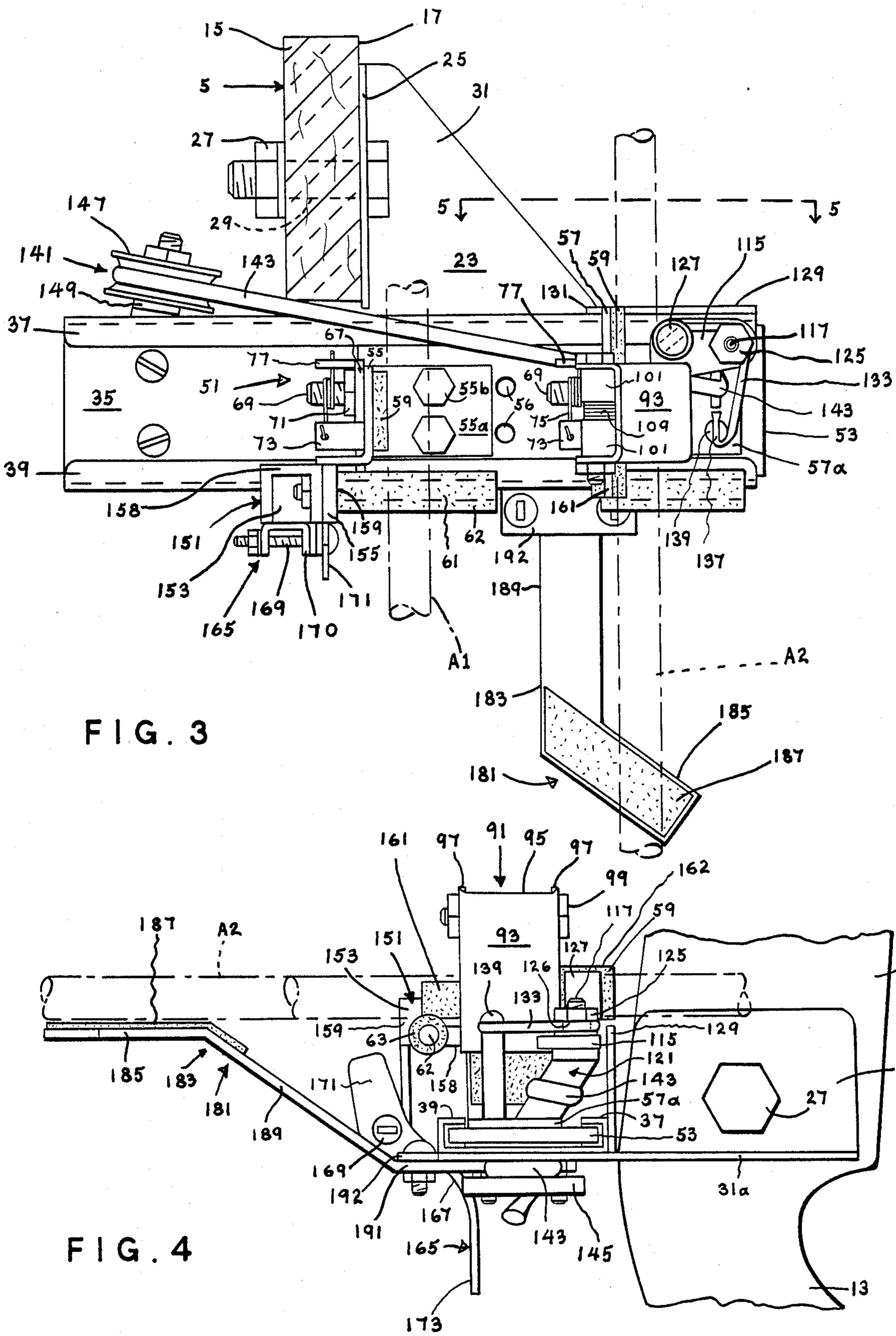
173
191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169
170
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A1
A2
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187
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FIG. 3

FIG. 4

FIG. 5

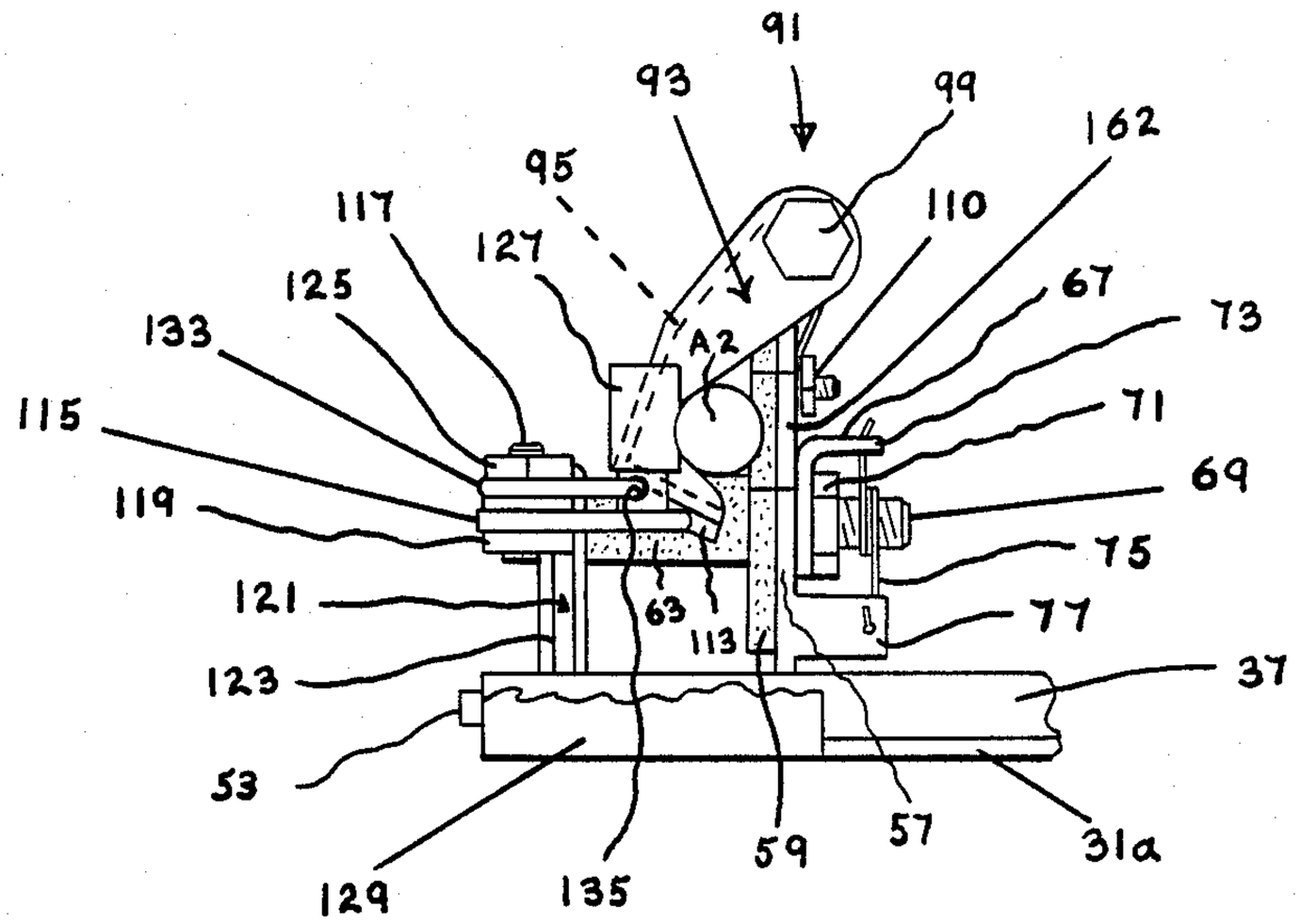
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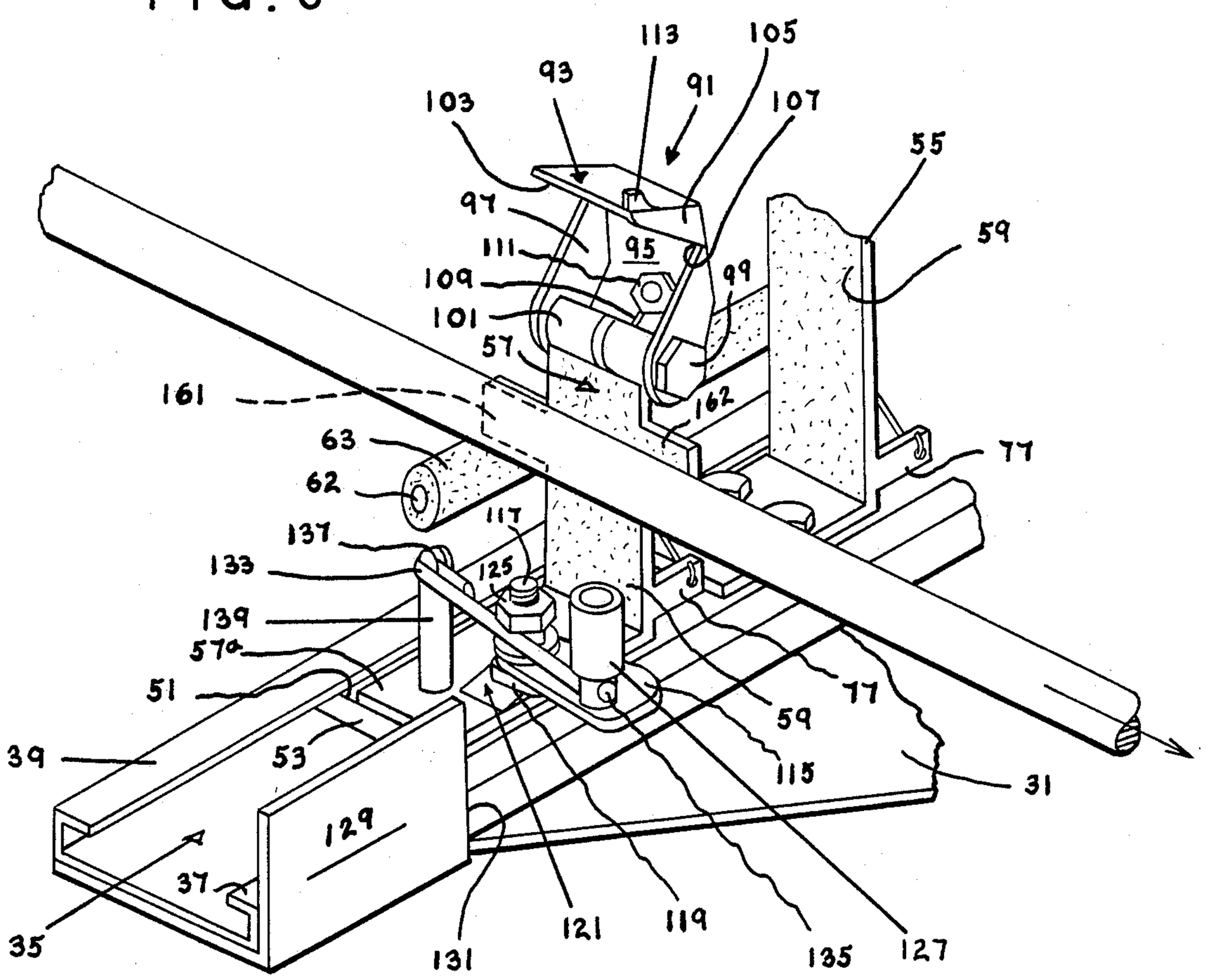
FIG. 6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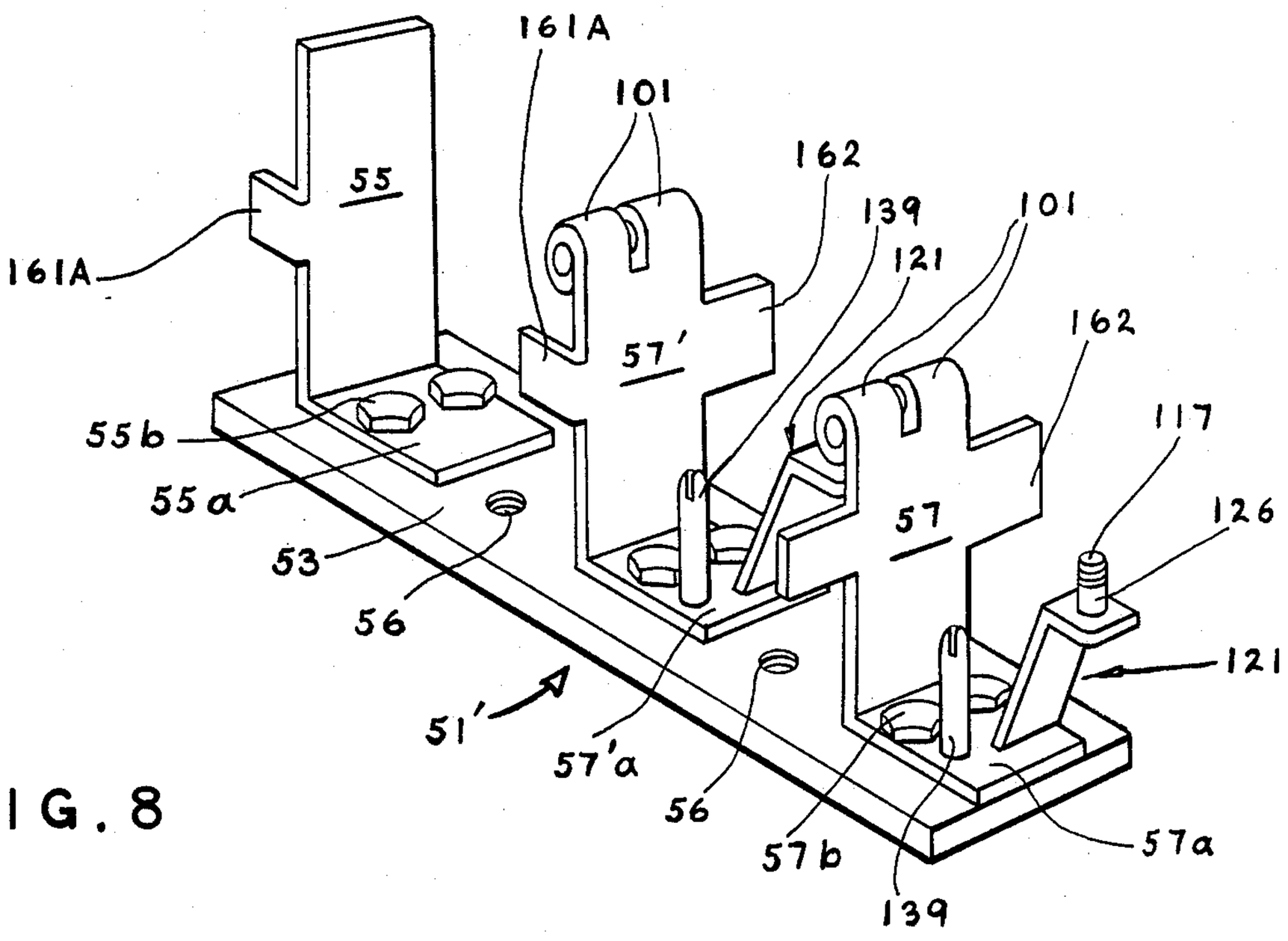
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161A
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162
139
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55b
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121
51'
57'a
56
57a
57b
139

FIG. 8

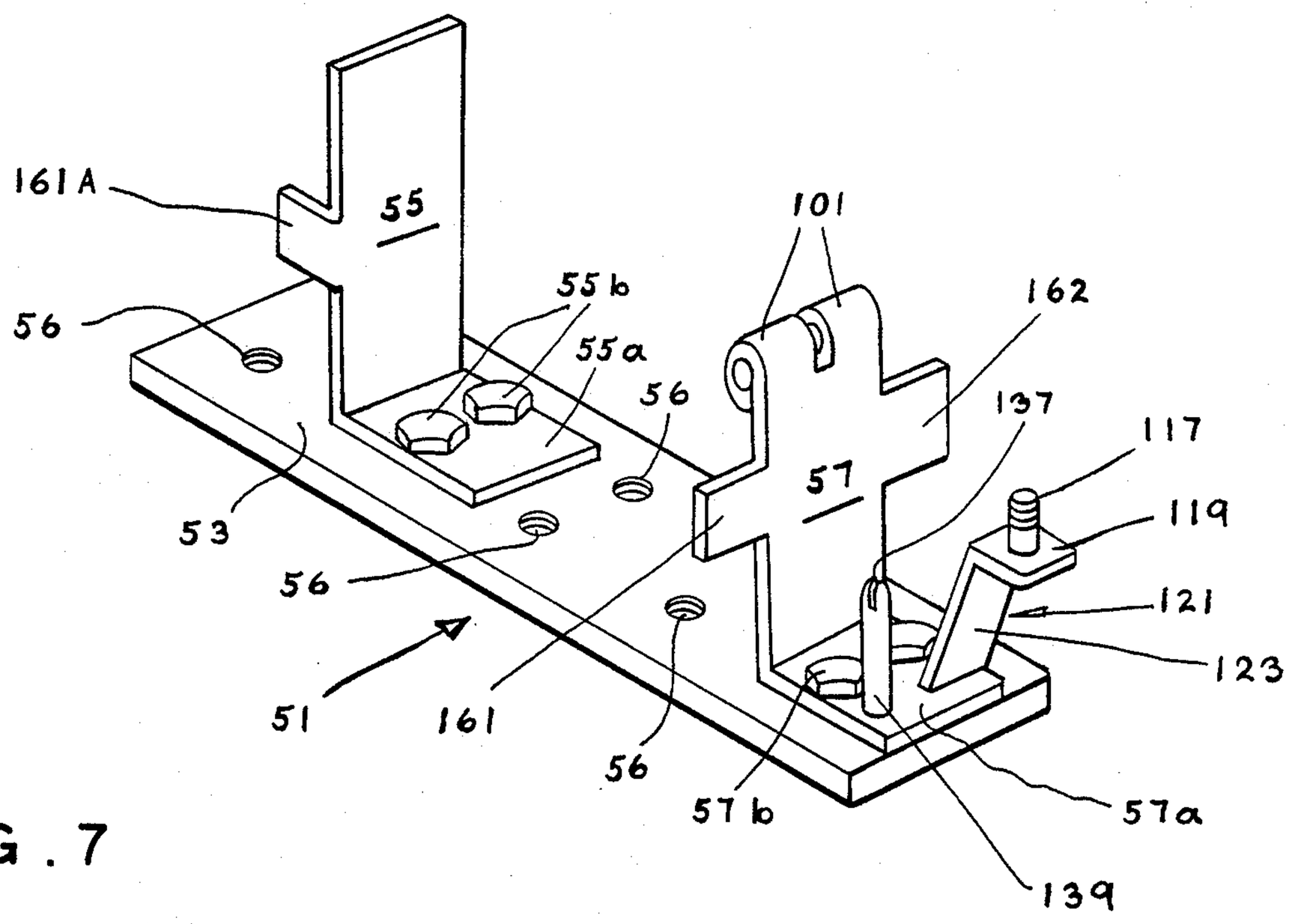
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FIG. 7

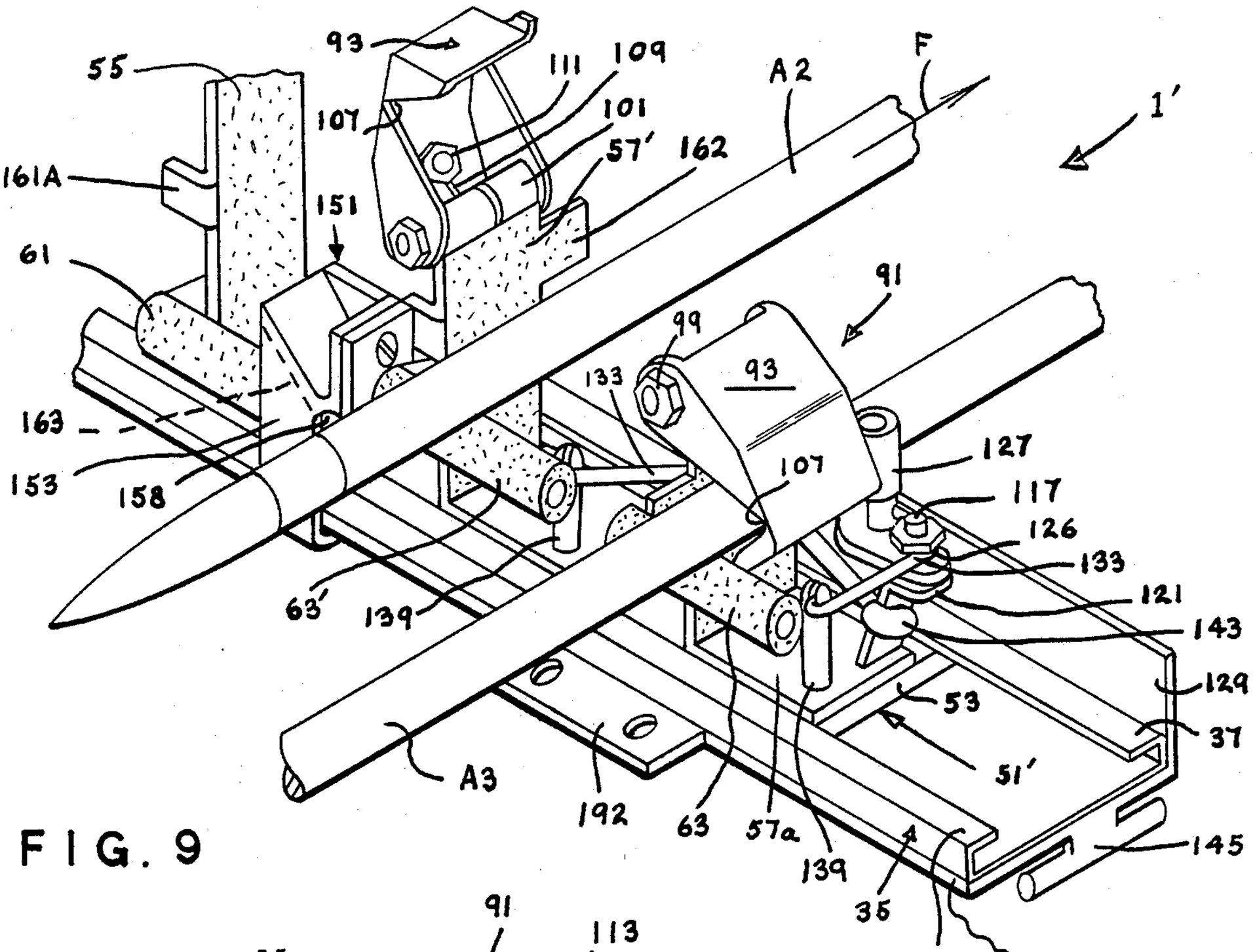
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FIG. 9

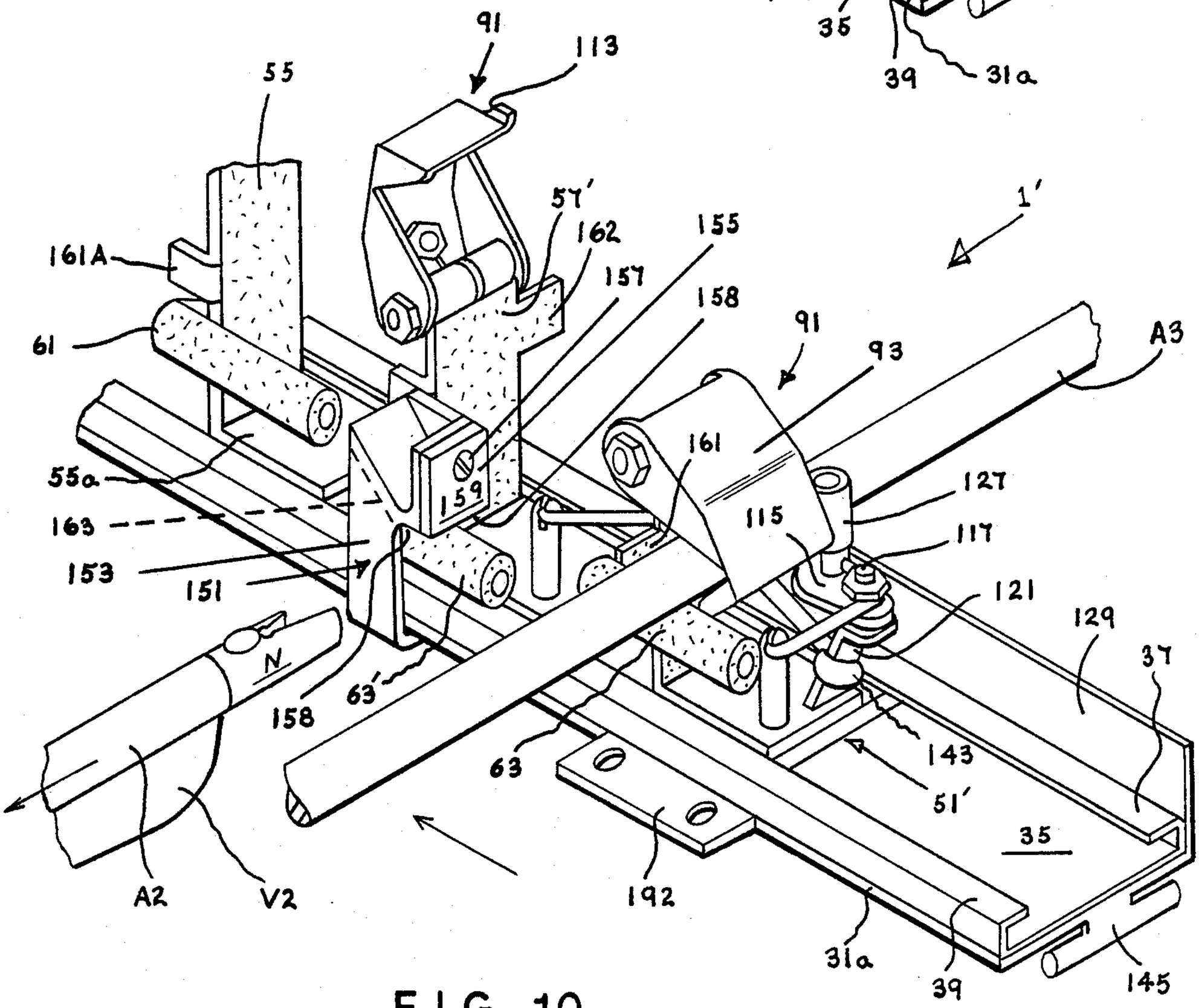
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FIG. 10

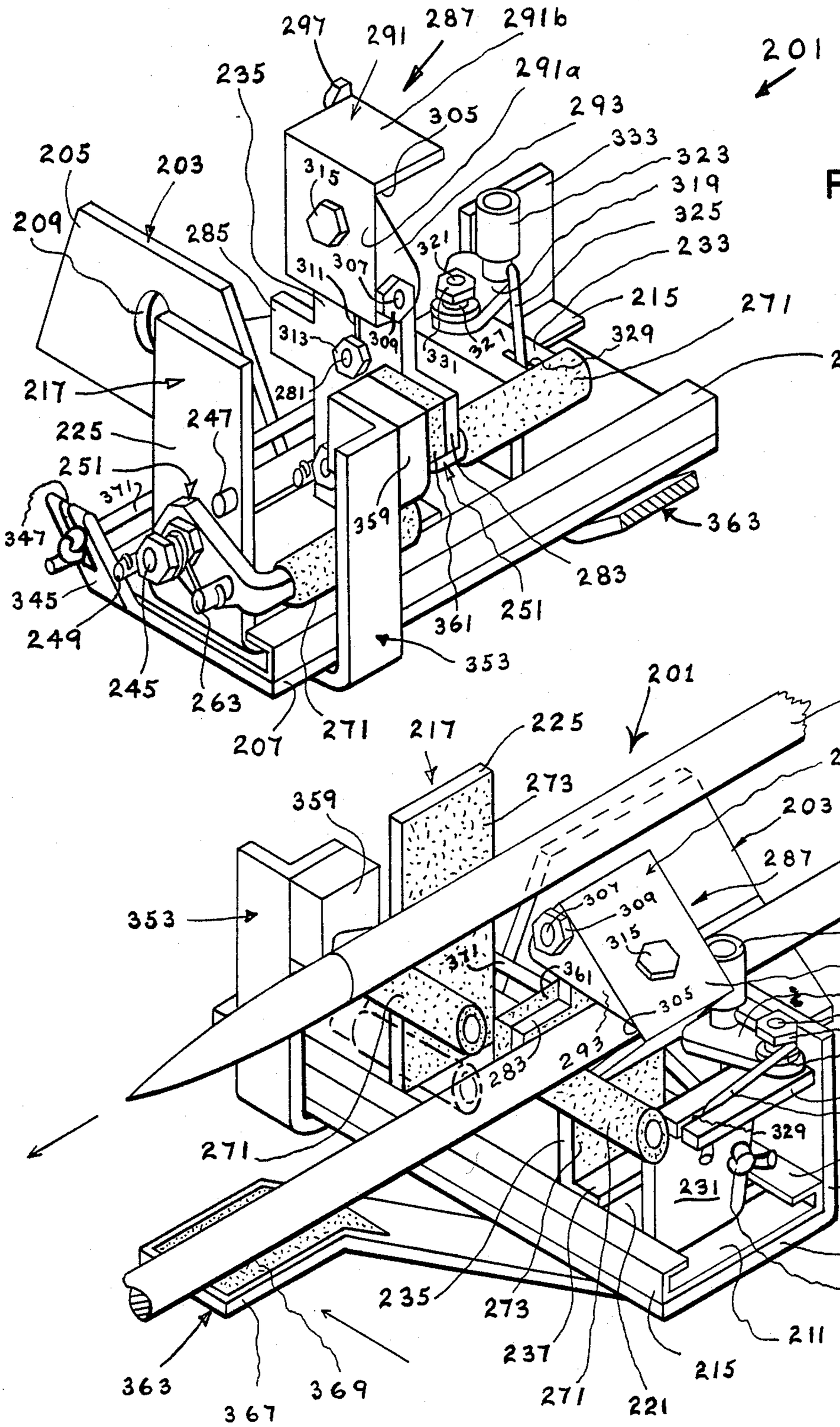
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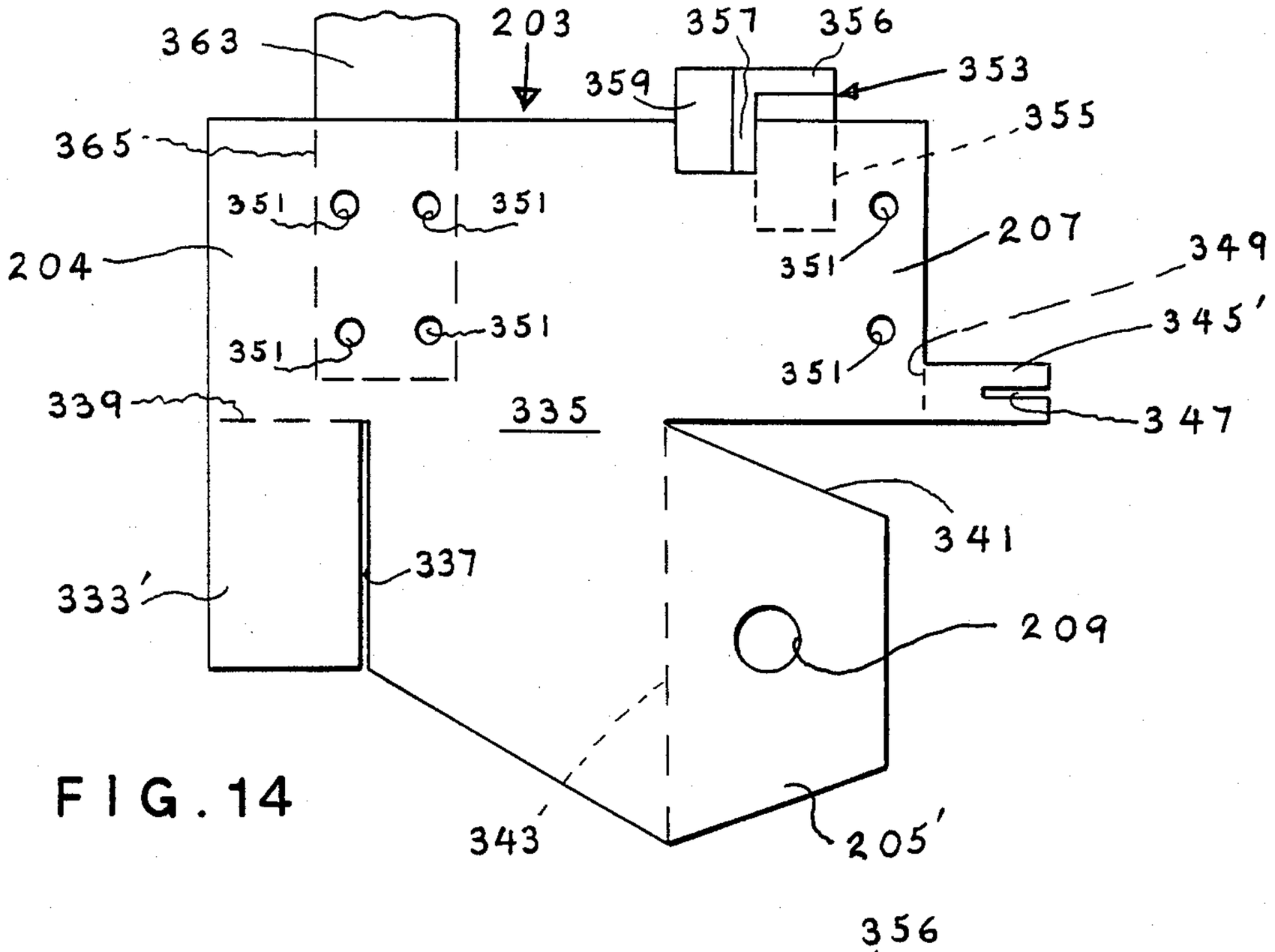
FIG. 12

FIG. 11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205'
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FIG. 14

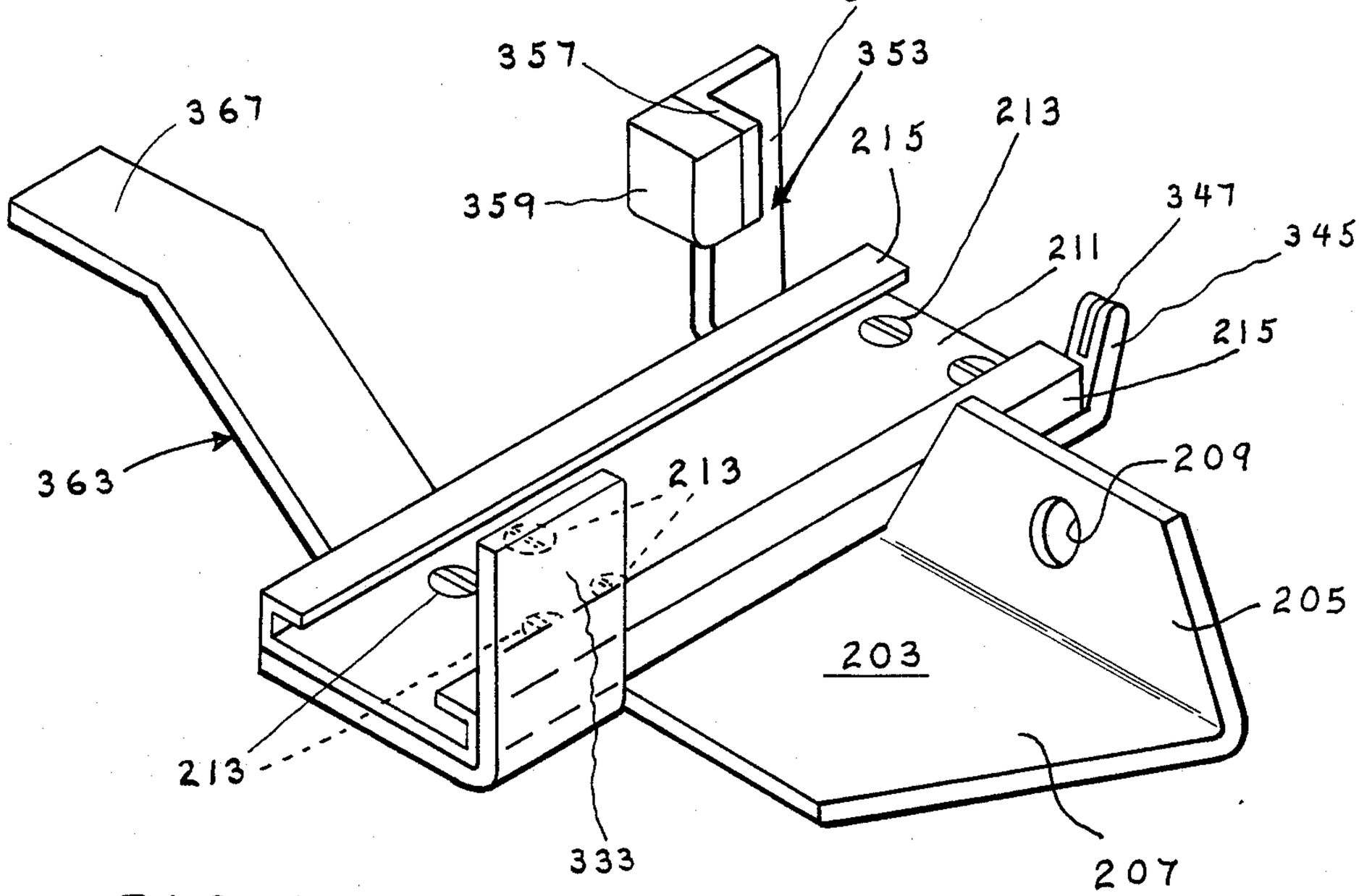
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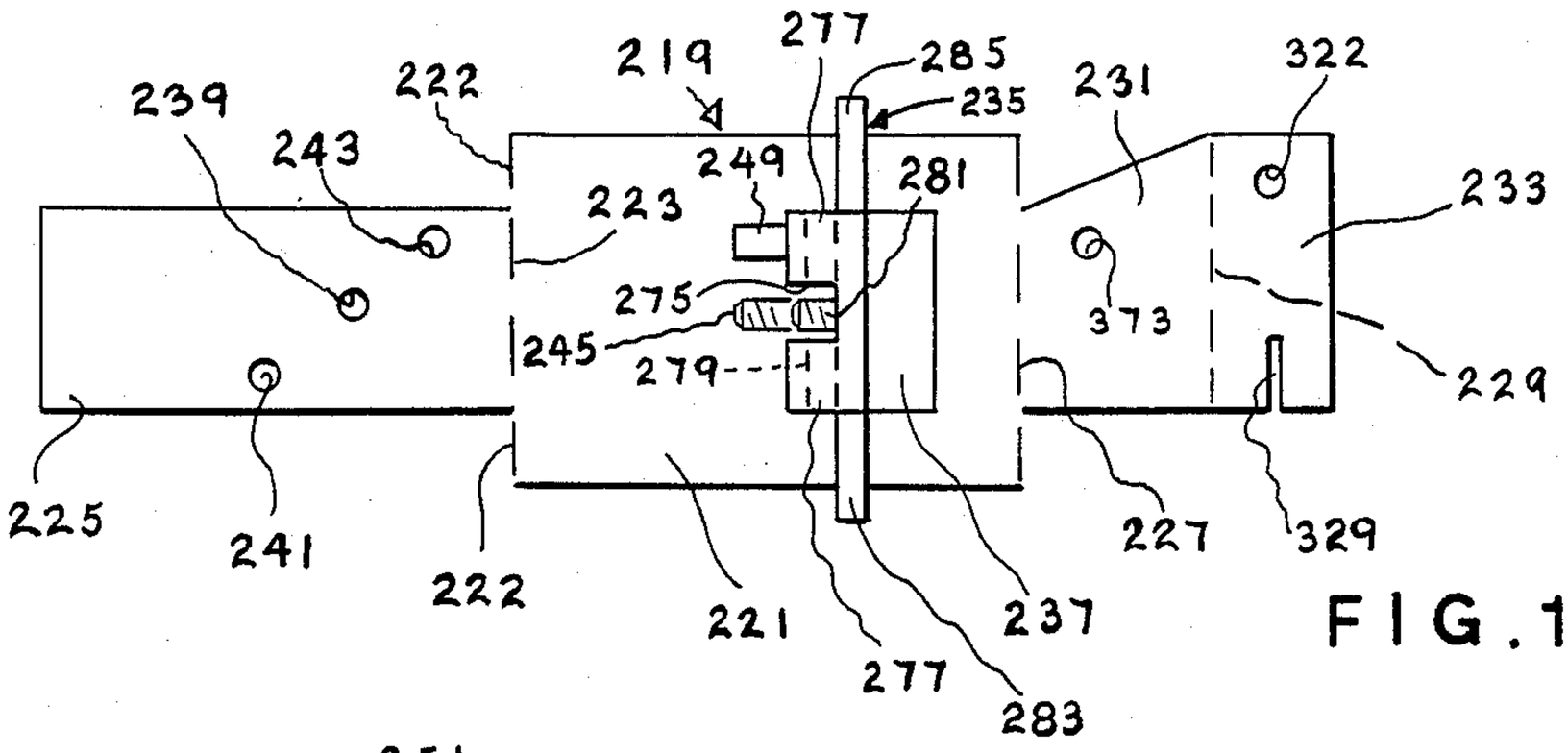
FIG. 13



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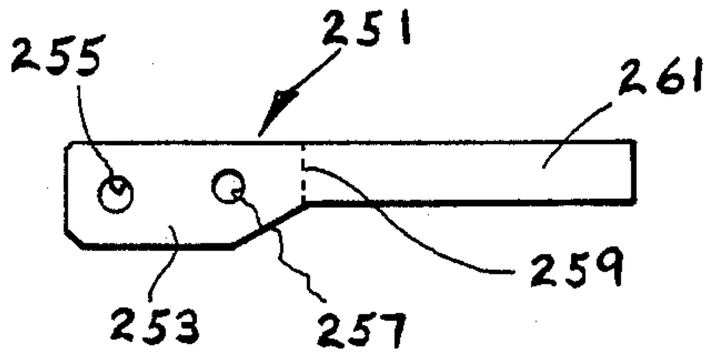
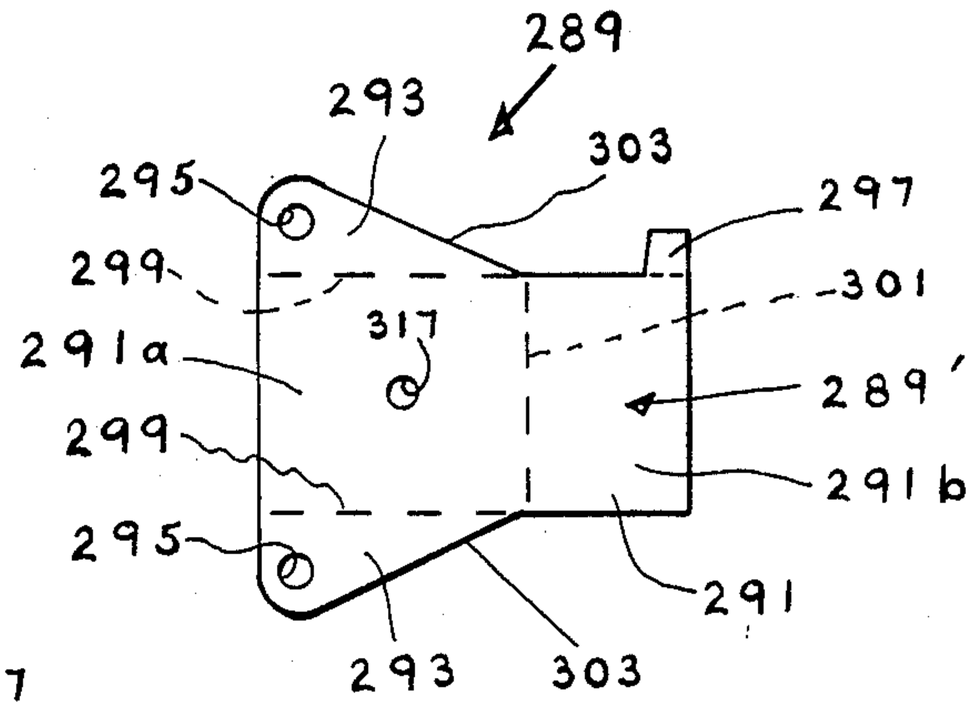


FIG. 17



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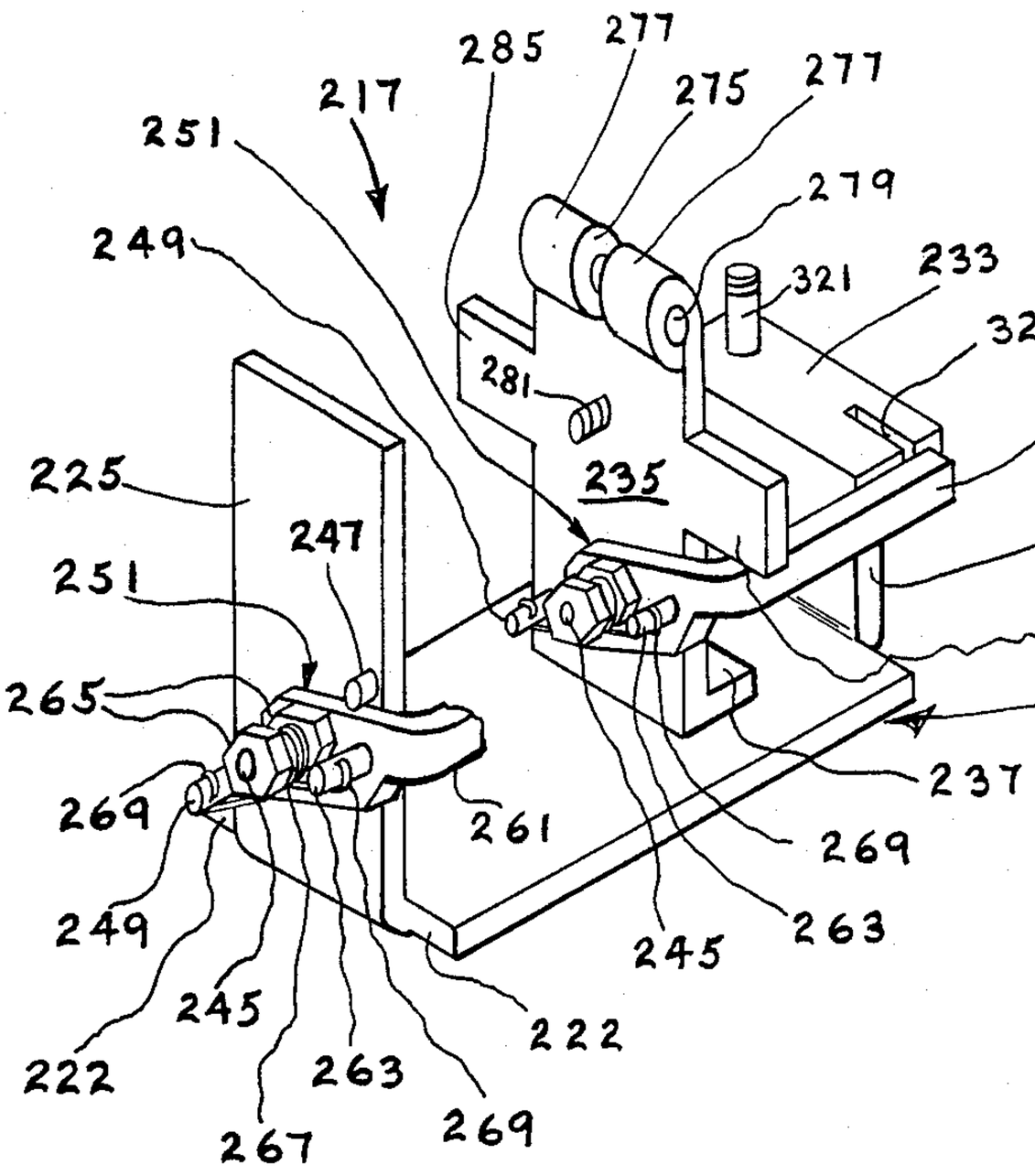

FIG. 15

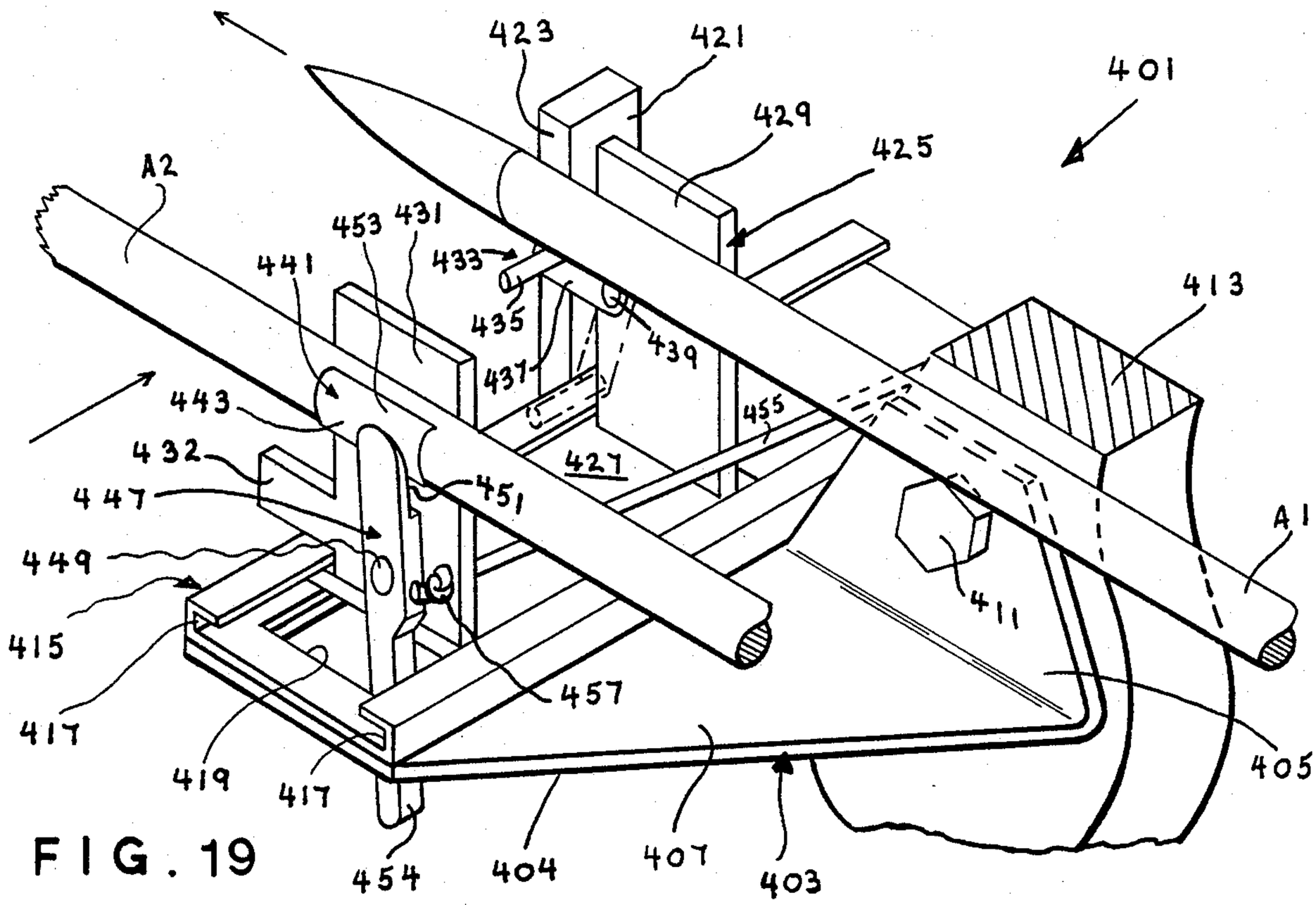
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FIG. 19

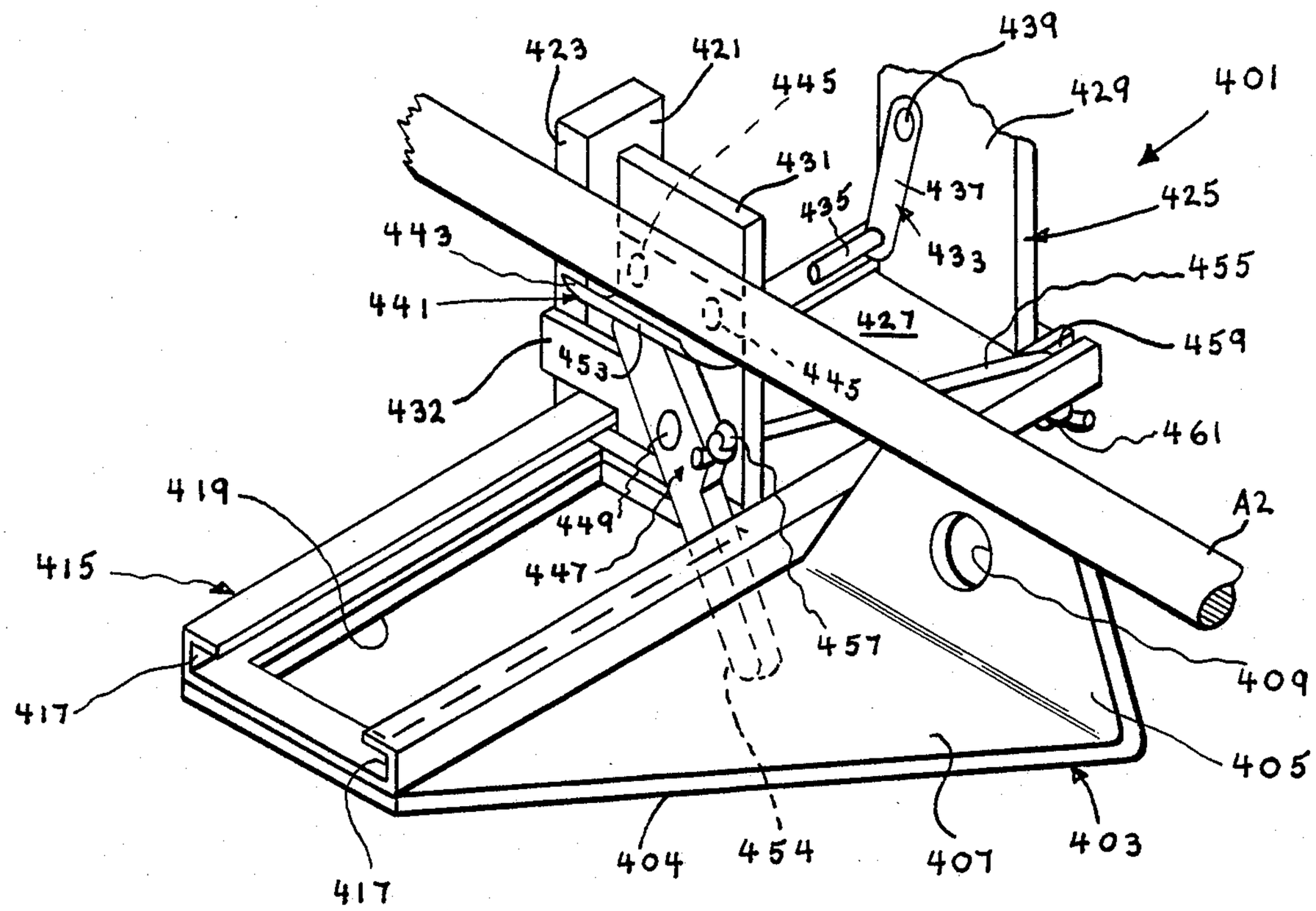
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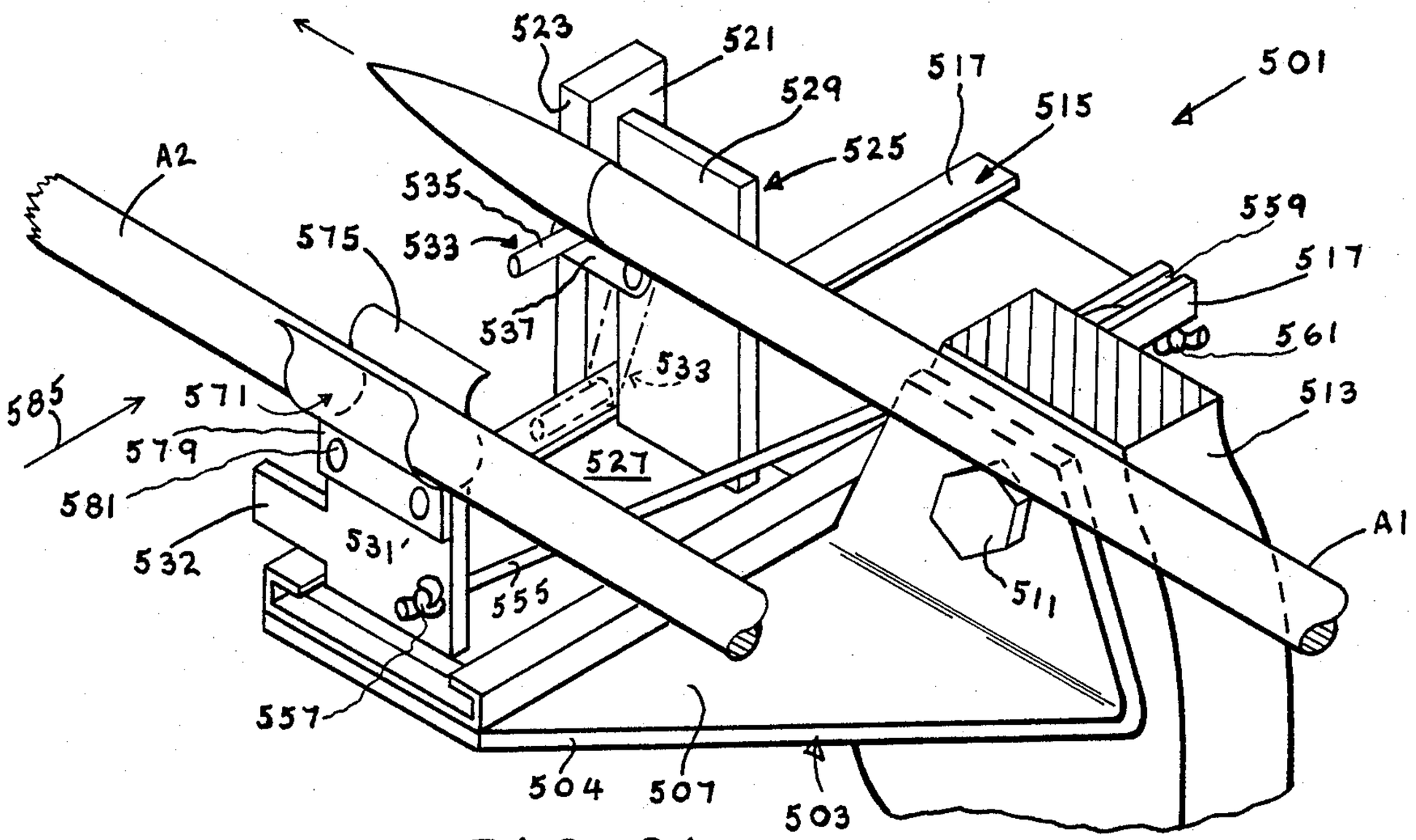
FIG. 20



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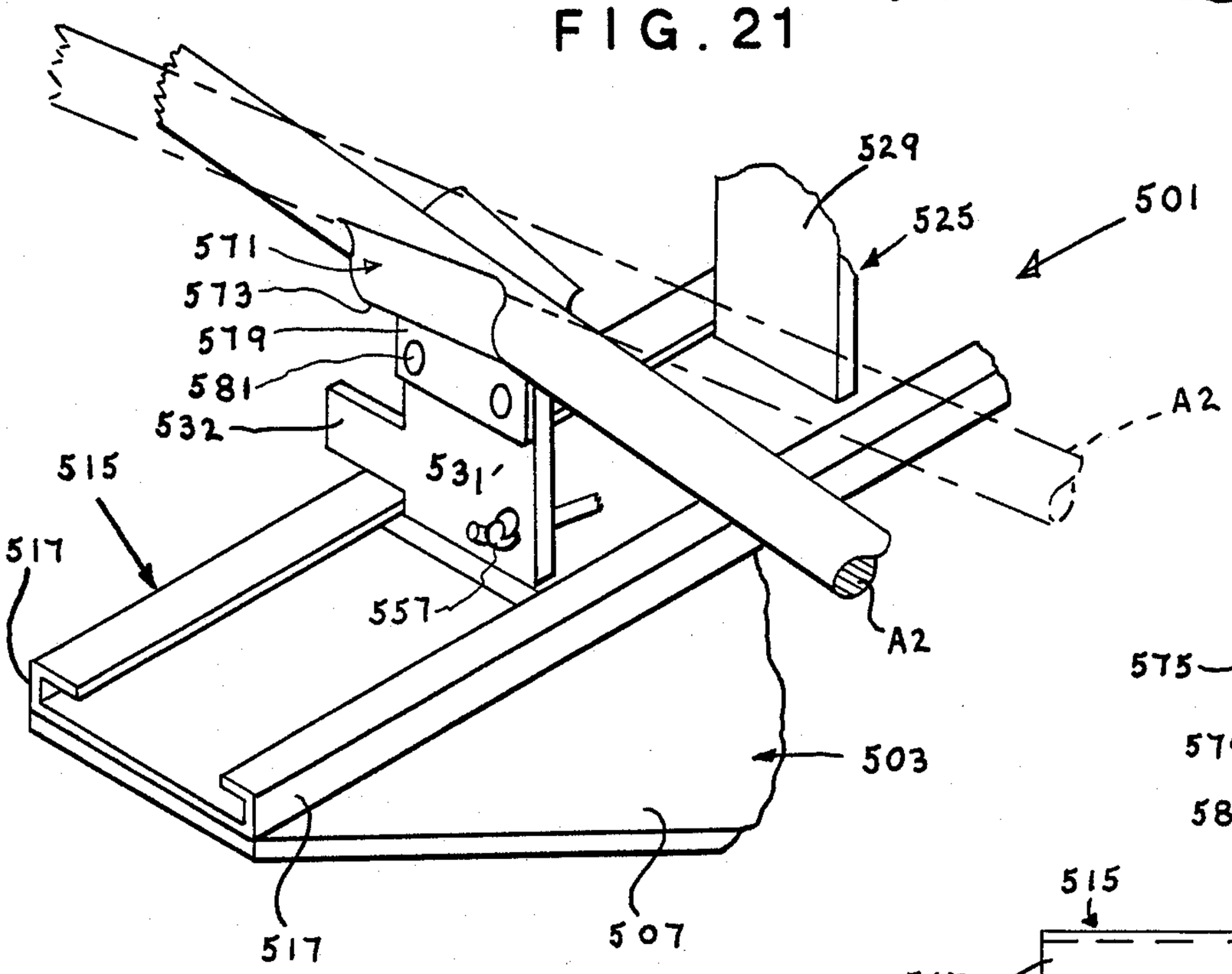

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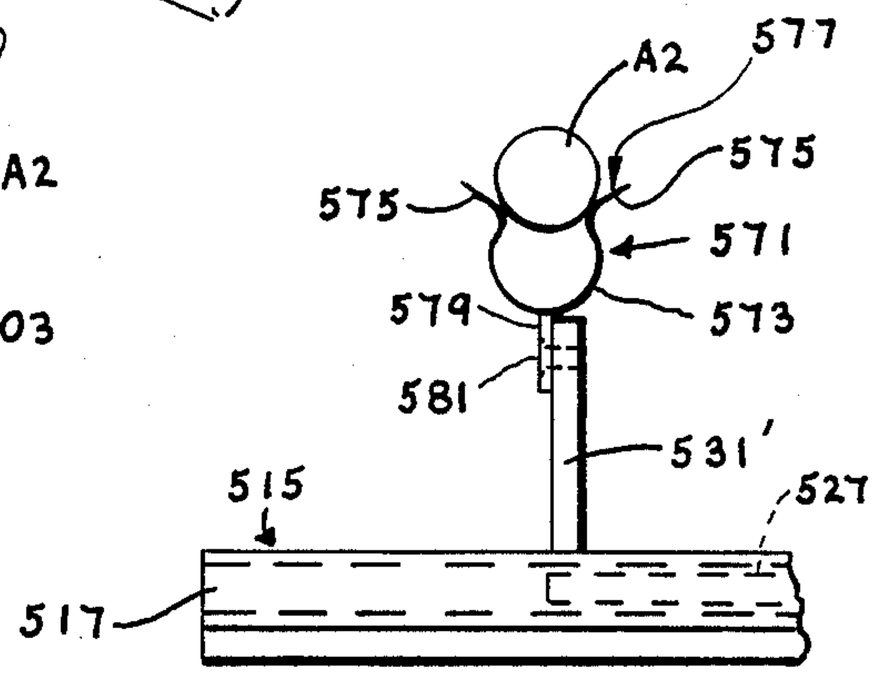
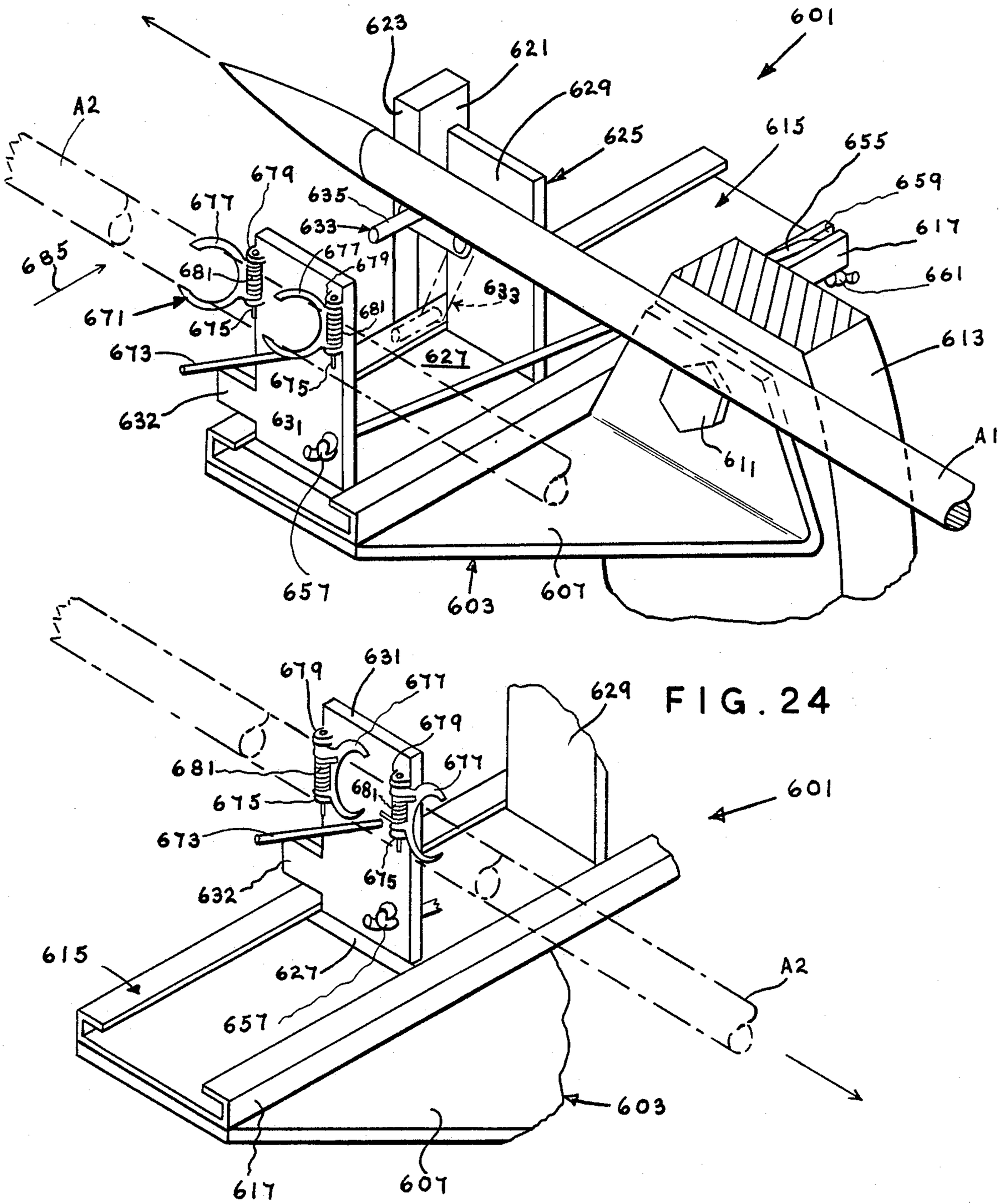


FIG. 22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A1
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FIG. 24

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FIG. 25

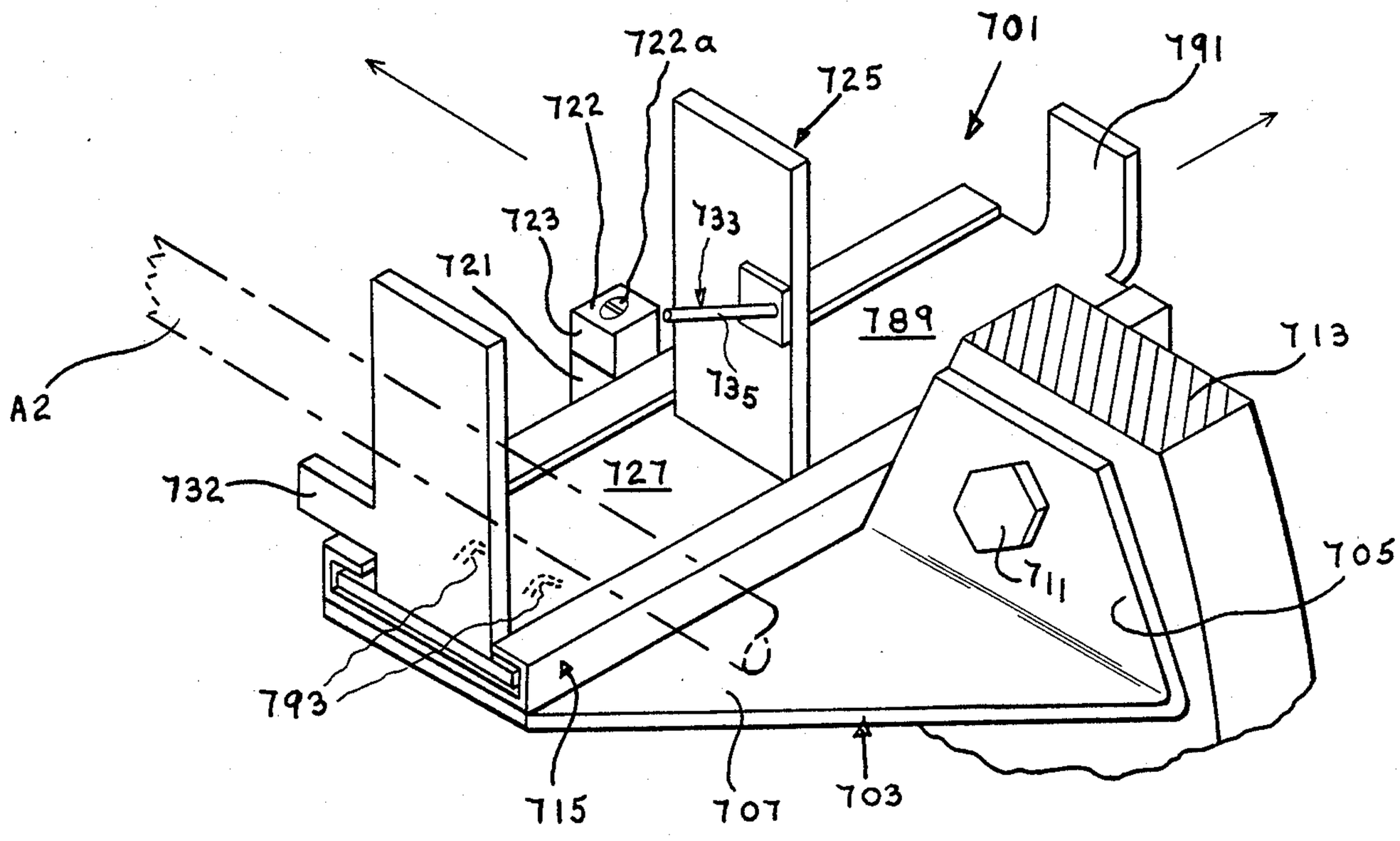
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FIG. 26

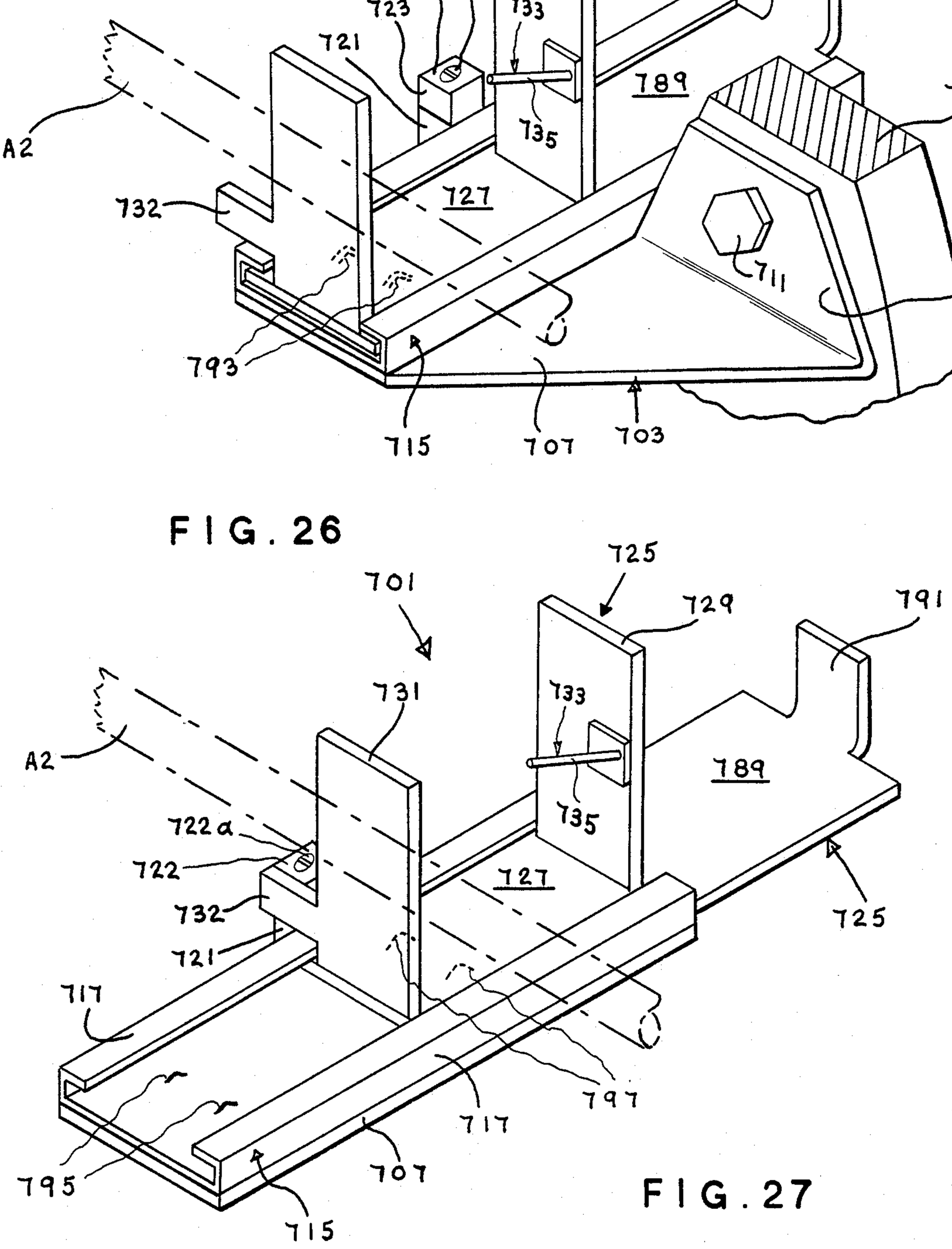
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FIG. 27

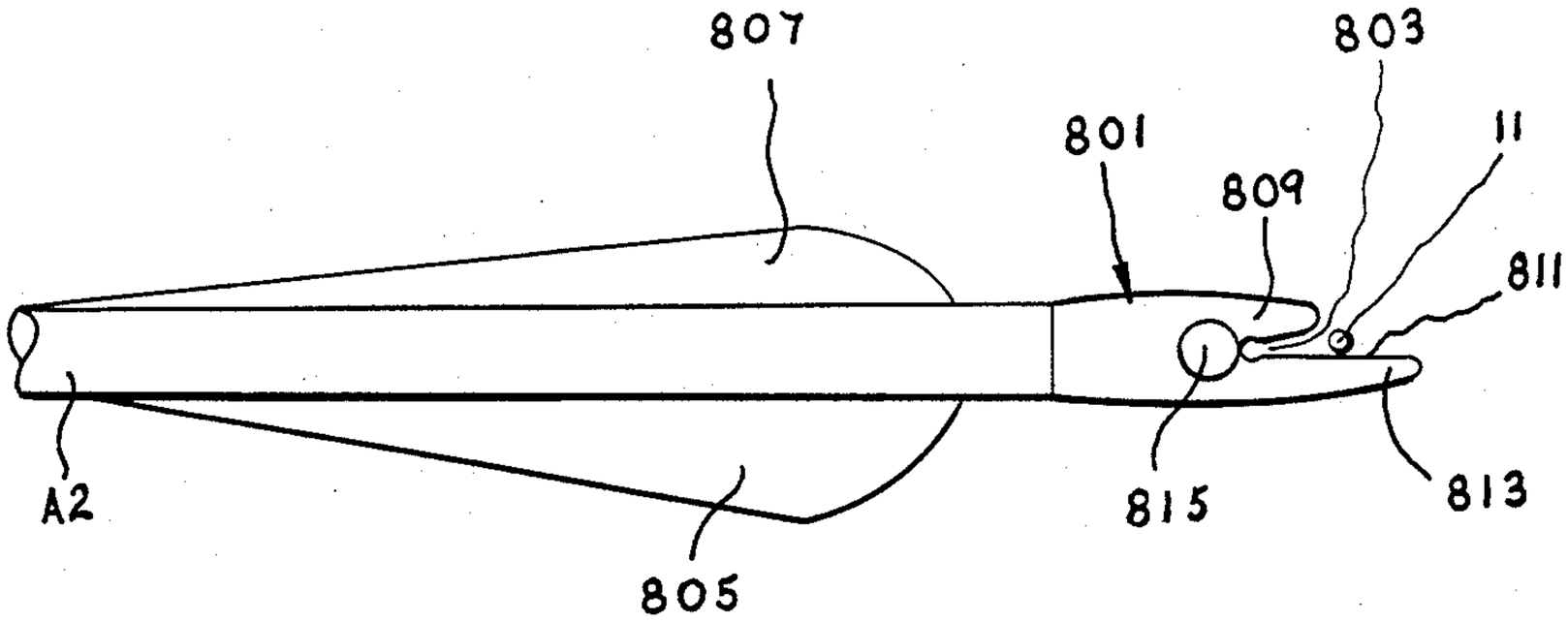
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FIG. 28

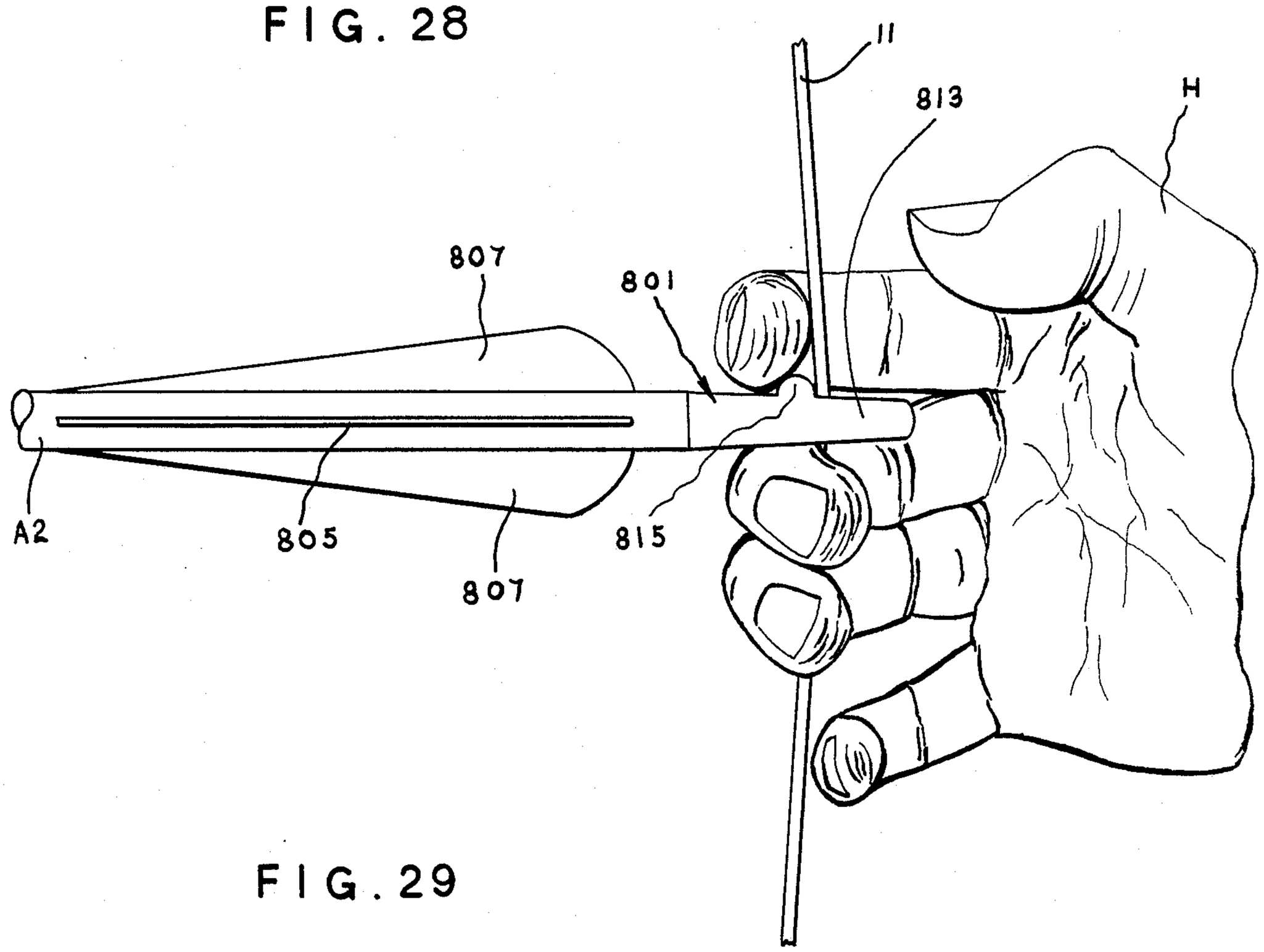
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FIG. 29

ARROW HOLDING AND LOADING DEVICE FOR ARCHERY BOWS

BACKGROUND OF THE INVENTION

In the sport of archery, and in bow hunting, the archer often wants to be able to make one or more follow-up shots. The value of these shots depends, of course, on the speed and accuracy with which they can be made. Minimizing the action and attention required of the archer will tend to increase speed and accuracy. In hunting, it is also important that the follow-up shots involve a minimum disturbance of the environment, i.e., minimum noise and motion.

BRIEF SUMMARY OF THE INVENTION

My invention relates to a mechanized arrow holding and loading device for bows.

It is a major objective of my invention to provide a follow-up arrow holding and loading device that minimizes involvement of the archer and disturbance of the environment during the brief time before shooting.

The invention accomplishes this objective by means of a structure that holds a follow-up arrow in such a way that it needs to be moved sideways only an inch or so to be ready to shoot. This structure firmly holds the follow-up arrow in a position that is parallel to but transversely separated from the shooting position for an arrow, i.e., the position in which the arrow is longitudinally aligned with the bowstring and ready for nocking, drawing, aiming, and release by the archer.

In preferred embodiments involving automatic operation, the construction is such that shooting of the first arrow releases a carriage holding the follow-up arrow so that the carriage is moved transversely the required inch or so by energy stored in a spring. This movement carries the follow-up arrow into the shooting position. The arrow is firmly held on the carriage by a holding, stabilizing, and clamping mechanism until it is released from this mechanism by the archer when he or she is ready for shooting. The construction is such that more than one follow-up arrow can be held on the carriage and the arrows moved successively into the shooting position. In this case, shooting of the first follow-up arrow releases the carriage to allow it to index transversely for an inch or so to bring the second follow-up arrow into shooting position. Likewise, shooting of the second follow-up arrow triggers action to bring the third follow-up arrow into position and so on.

While it is preferred that the carriage be moved automatically by energy stored in a spring during the loading of arrows on the carriage, manual indexing of the carriage with its follow-up arrow or arrows is within the broad purview of the invention and is illustrated herein.

Similarly, while it is preferred that the holding mechanism be automatically released when the archer grasps and draws the follow-up arrow, manual release is within the broad purview of the invention and is illustrated herein.

The presently preferred embodiment of the invention has a frame with a flange that enables it to be rigidly bolted in place on various kinds of bows that are available on the open market. For a right-handed archer, the frame extends horizontally and to the left of the bow. A carriage is mounted on the frame and it is constructed to support the first or initial arrow in a shooting position, ready to be shot by the archer. The carriage is also

constructed to carry one or more follow-up arrows and firmly support them in pre-shooting positions parallel to each other and to the first arrow. The carriage moves from left to right on the frame during unloading of the arrows. For each of the follow-up arrows (but not the first or initial arrow), the carriage has an arrow holding, stabilizing, and clamping mechanism to firmly hold the follow-up arrow in the desired alignment, i.e., the pre-shooting position. This mechanism is designed to release the follow-up arrow automatically when it is brought by the carriage into a position wherein the pre-shooting position coincides with the shooting position and the arrow is drawn to the rear by the archer. The frame includes a retention means that helps to prevent premature release of the mechanism before the follow-up arrow reaches the shooting position, i.e., while the arrow is in the pre-shooting position.

Each support means for each arrow on the carriage may be thought of as a station, with the initial arrow being the first station. Beginning at the last unloaded station, arrows are loaded on to the carriage at the shooting position, the holding mechanism closed, and the carriage moved from right to left. Closing of the holding mechanism stores energy in a spring that urges the mechanism to open but is prevented from doing so by a latch means and, as a back-up, by the retention means.

Movement of the carriage from right to left while loading it with arrows stores energy in a spring means that urges it to move in its direction of operation from left to right, i.e., in order to bring a follow-up arrow into shooting position. Such operative, left to right, movement of the carriage is prevented, however, by engagement of a stop member on the carriage with a fixed stop and alignment face on the frame which is located to place the adjacent arrow in the shooting position. The last station has a fixed stop member to engage the stop face and hold the carriage on the frame. The remaining stations have movable stop members that are spring urged to positions in which they will engage the stop face and therefore prevent rightward movement of the carriage. Preferably, each movable stop member is associated with an arrowrest for supporting the first arrow in the shooting position or a follow-up arrow in the pre-shooting position. When the arrow is shot, a radial projection on the arrow (such as the fletching) rides over the arrowrest to move the movable stop member away from the stop face. As soon as this occurs, the carriage is released and is automatically indexed by the spring means to the next station. It is automatically stopped by engagement of that station's stop member with the stop face so that the arrow in that station is in the shooting position. A manually operated, movable stop face is illustrated herein which the archer can use, if desired, to avoid automatic indexing.

When an arrow is loaded on the carriage, it is preferable that it be angularly adjusted so that the bow string groove in the nock is parallel to the bow string and plane of the bow. Thus, when it is fed into the shooting position, it is only necessary for the archer to draw it straight back to achieve nocking. Nocking is even further facilitated by a feature of the invention wherein the arrow nock is modified to eliminate most of the wall on the side of the groove. When an arrow with the modified nock is loaded on the carriage it is angularly adjusted so that this side of the nock (with minimum wall) is on the bow side and transversely aligned with the

bow string. When such arrow is brought into the shooting position, this side of the nock will clear the bow string but the unmodified or full wall will not. Thus, the arrow is put into practically a nocked position by the action of the loading device.

Other objects and features of the invention will become apparent upon consideration of the accompanying drawings and the detailed description of several embodiments.

DESCRIPTION OF THE DRAWINGS

The arrowholding and loading device of the invention (often referred to herein simply as the "loader") is shown in the drawings and described for use on a right-handed bow by right-handed archers. It should be understood that the device could be reversed and face the opposite direction and used on left-handed bows by left-handed archers.

FIG. **1** is a perspective view of an archery bow with a loader according to the invention secured to it;

FIG. **2** is an enlarged front elevation of the loader shown in FIG. **1**;

FIG. **3** is a top plan view (with the bow in section) of the arrow loader shown in FIG. **2**;

FIG. **4** is a side elevation taken from the right of FIG. **3** of the loader;

FIG. **5** is a view taken approximately along the line **5—5** of FIG. **3** looking at the back of the left end of the loader as seen by the archer;

FIG. **6** is a perspective view (with structure omitted) of the loader and intended primarily to show the arrow clamp and clamp latch mechanisms;

FIG. **7** is a perspective view (with parts omitted) of a two station carriage and shows that the positions of the stations may be adjusted to vary the spacing of the arrows;

FIG. **8** is a view similar to FIG. **7** but shows a three station carriage;

FIG. **9** is a perspective view of a three station loader (with parts omitted for clarity) according to the invention and showing arrow **A2** at the second station just about ready to be released by the archer;

FIG. **10** is a perspective view similar to that of FIG. **9** but illustrates how released arrow **A2** has depressed the arrow rest to permit indexing of the carriage.

FIG. **11** is a perspective view of another form of loader having two stations and intended especially for use in bow hunting;

FIG. **12** is another perspective view of the loader of FIG. **11**.

FIG. **13** is a perspective view of the support frame and track used in the loader of FIG. **11**;

FIG. **14** is a plan view of the support frame of FIGS. **11–13** showing a stage in its formation;

FIG. **15** is a perspective view (with parts omitted) of the carriage assembly used in the loader of FIGS. **11–12**;

FIG. **16** is a plan view of a part of the carriage assembly of FIG. **15** showing a stage in its formation;

FIG. **17** is a plan view of a part of an arrow rest member shown in FIG. **15** showing a stage in its formation;

FIG. **18** is a plan view of a clamp member shown in FIGS. **11–12** showing a stage in its formation;

FIG. **19** is a perspective view with parts omitted and broken away showing another form of loader;

FIG. **20** is a second perspective view of the loader of FIG. **19** showing the carriage after release of the first arrow;

FIG. **21** is a perspective view with parts omitted and broken away showing still another form of loader;

FIG. **22** is a schematic view illustrating the operation of the arrow support used in the loader of FIG. **21**;

FIG. **23** is a perspective view similar to FIG. **21** but showing the carriage in a first arrow released position and illustrating operation of the arrow support;

FIG. **24** is a perspective view with parts omitted and broken away showing yet another form of loader;

FIG. **25** is a perspective view of the loader of FIG. **24** showing operation of the arrow rest and holding means in the arrow released position;

FIG. **26** is a perspective view with parts omitted and broken away of a loader in which the carriage is moved manually instead of by spring force;

FIG. **27** is a perspective view of the loader of FIG. **26** showing the carriage moved into position for release of the second arrow;

FIG. **28** is a somewhat schematic top view showing use of a nock according to a feature of the invention; and

FIG. **29** is a side view of the nock usage as shown in FIG. **28**.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

As seen in FIG. **1**, an arrow holder and loader **1**, according to the present invention, is shown mounted on a bow **3** which may be any of a wide variety of constructions. The bow **3** illustrated is to be used by a right handed archer and has a central riser section **5** to which are secured upper and lower resilient limb sections **7** and **9**, respectively. A bow string **11** is attached by suitable means to the ends of the limb sections and has a nocking point (not shown in detail) that defines one end of a "center line" for the bow **3**, the other end being defined by the point where a nocked arrow would be properly supported on the riser section **5** in proper shooting position to be shot by the archer. The "plane" of the bow may be regarded as the plane which contains this center line and the bow string **11**.

As is conventional, the riser section **5** has a hand grip portion **13** (FIG. **2**) adapted to be grasped by the left hand of the archer. The hand grip portion **13** is located on the left side (as seen by the archer) of the plane of the bow. Just above it and offset to the right of the portion **13** is the offset bow window portion **15** that includes a flat vertical wall (often called the "arrow plate") **17** that is substantially parallel to and located slightly to the right of the plane of the bow.

The arrow holder and loader **1** of this invention has a support frame **23** (FIG. **3**) to secure it to the riser **5**. It may be formed from sheet metal and have a flat vertical flange section **25** that is in solid contact with wall **17** and securely clamped against it by a bolt and nut assembly **27** that extends through a hole **29** in the portion **15**. The support frame **23** includes a flat plate section **31** which projects at right angles to vertical flange section **25** so that it extends to the left of wall **17**. It extends also to and beyond the front of the riser section **5** where it provides a substantially rectangularly shaped horizontal shelf **31***a* (FIGS. **2** and **4**) that is normal to the plane of the bow.

A track means or assembly **35** is rigidly attached, as by welding or bolting, to the top of shelf **31***a* and there-

fore to the riser section **5**. The assembly **35** includes parallel rails **37** and **39** which are in front of the riser section **5** and which extend at right angles to the plane of the bow. As seen in FIGS. **2** and **3** and from the archer's position, a major part of the track assembly is located on the left of the riser section **5**. In the embodiment of the invention illustrated, the rails are opposite sides of a C-shaped channel having its back flat against and secured to the top of shelf **31***a* (FIG. **4**).

An arrow carriage assembly **51** (to hold and load the arrows) is mounted on the track means **35** provided by the channel shaped rails **37** and **39** to move between a fully loaded postion at the left ends of the rails (FIGS. **2** and **3**) and an unloaded position (not shown) at the right ends of the rails. The carriage assembly **51** includes a substantially flat plate-like traveler member **53** that fits in and slides in the channel rails **37** and **39**. As seen best in FIG. **6** which shows a loader for two arrows (an initial or first arrow and one follow-up arrow), the member **53** carries two rigid vertical arrow alignment walls **55** and **57** that are parallel to the plane of the bow. Wall **55** is located at the right end of the member **53** (as seen by the archer) and wall **57** is located near but spaced from the left end of the member **53**. As will be subsequently recognized, wall **55**, in effect, defines a first arrow alignment station for an arrow **A1** (which is on the center line of the bow or shooting position ready to be shot); the wall **57** defines, in effect, a second arrow alignment station and pre-shooting position for the follow-up arrow **A2**. Arrow **A2** can be shot when it is moved by the carriage into the plane of the bow so that the arrow **A2** is substantially coaxial with the center line of the bow, i.e., in the shooting position.

Wall **55** has a right angle foot or flange **55***a* (FIG. **3**) at the bottom which sits on top of plate **53** and is rigidly secured to it by screws **55***b* threaded into pairs of holes **56** in the plate. Additional pairs of holes **56** provide for adjustment of the location of the wall **55**. Similarly wall **57** has a right angle foot or flange **57***a* (FIGS. **3–4**) at its bottom which sits on top of plate **53** and is rigidly attached to it by screws **57***b* (FIG. **2**). If it is desired to hold more than one follow-up arrow, additional vertical walls **57'** defining additional arrow alignment stations (FIGS. **8–10**) may be secured to member **53** between first and last walls **55** and **57**. This may require a longer member **53** and additional pairs of holes **56**.

The left sides of the walls **55** and **57** (and any walls **57'**) are preferably each covered with a layer or face **59** of relatively soft, non-metallic, sound-deadening material (such as material identified as "Velcro") and it is these layers which engage, position and guide the arrows **A1** and **A2** (or **A3**, etc.) as shown in FIGS. **2** and **3** (and FIGS. **9** and **10**).

As also seen in FIGS. **2** to **4**, the shafts of the arrows rest on members **61** and **63**, respectively, which are basically small metal shafts **62** each covered on the outside with a sleeve or layer of soft non-metallic material (such as "Velcro") corresponding to layers **59**. The members **61** and **63** are mounted on vertical walls **55** and **57**, respectively, and are movable downwardly from their "up", arrow supporting and guiding positions shown in FIGS. **1–4**, when fletching, vanes, or projections on arrows that are released ride over them. In terms of a conventional bow and riser, the layers **59** and walls **55** and **57** serve as arrow plates and the members **61** and **63** serve as arrow rests. The combination of each arrow plate and arrow rest provides what may be regarded as an arrow locator or support means for supporting the arrow in the shooting or pre-shooting position. Movement of the arrow rests tends to reduce deflection of the arrows when they are shot.

As will be described later, movement of members **61** and **63** is used to trigger or control movement of the carriage assembly **51** by a spring motor means. The movable mounting of members **61** and **63** on their respective vertical plates **55** and **57** (or **57'**) is substantially the same for each member. Each member is integral or affixed at its right end to the forward end of a lever member **67** that is positioned against the right side of its respective vertical wall **55** or **57** and rockably or pivotally mounted on it by means of a pivot pin **69** (FIG. **5**) affixed to the wall so that it is horizontal and normal to the plane of the bow. The right end of the pin **69** is threaded to receive a nut **71** whereby the lever **67** is held against the plate. The lever member **67** has a transverse flange **73** on its top and right side. Pressing upwardly against the underside of the flange **73** and anchored in a hole in it is one end of a piece of spring wire **75** and this yieldably urges the arrow rest member **61** or **63** to the uppermost position shown in the drawings. The wire **75** has a central portion loosely looped around the end portion of pin **69** and its other end is anchored in a hole in flange arm **77** that is integral with the vertical wall but is bent at a right angle, to the right, to the wall as seen best in FIGS. **5** and **6**.

FIGS. **1–7** show an arrow holder and loader **1** that supports two arrows (**A1** and **A2**), i.e., a two station mechanism. The first station, for the initial arrow **A1**, is represented by wall **55**; and the second station, for the follow-up arrow **A2**, is represented by wall **57**. Arrow **A1** is on the center line of the bow and in shooting position. However, before follow-up arrow **A2** can be released, it must be translated or moved transversely to the right (as seen by the archer) so that wall **57** assumes the transverse position now occupied by wall **55**. During this movement and during all the period that arrow **A2** is supported on arrow rest **63** and wall or arrow plate **57**, the archer is concerned with arrow **A1** and his hands are not available to held hold arrow **A2** in a proper position. Accordingly, the loader **1** includes an arrow holding, stabilizing, and clamping means **91** for each station except the first (i.e., for each follow-up arrow) to firmly hold the follow-up arrows in proper position until they are ready to be grasped and pulled back by the archer.

As seen in FIGS. **1–6**, the holder means **91** includes holder and stabilizer member **93** that is movably mounted on the top of wall **57** to pivot about a horizontal axis parallel to the plane of the bow. In side elevation the member **93** has a shape which is somewhat similar to that of a person's forefinger that is bent substantially at the knuckle. This shape enables it to extend around the arrow **A2** when it is supported on arrow rest **63** against facing **59** on wall **57**. Thus, the member **93** may be formed of sheet metal to have a body wall portion **95** of generally C-shape. Adjacent one end of the C-shape and on opposite sides (i.e., the front and rear) of the portion **95**, it is formed to have triangularly shaped parallel flanges **97** that extend at right angles to the portion **95**. The flanges **97** have aligned openings to receive a pivot pin **99** (shown in the form of a nut and screw) which extends through and is pivotally supported in a pair of spaced journal portions **101** provided at the top of plate **57**, as by bending a pair of flanges at the top of the plate **57** in a clockwise direction (FIG. **7**) into a circular shape that defines a pivot axis at the top of and to the

right of the plate **57**. The inside faces of holder member flanges **97** fit over the end faces of journal portions **101** to hold the member **93** in fixed fore and aft position at all times. The member **93** is arranged so that in arrow holding position it extends downwardly from pivot **99** and on the left or arrow rest side of the plate **57** (or **57'** if more than two follow-up arrows are to be carried by the loader). In the holding position it curves around the arrow **A2** and has a free (or cantilever-type) end **103** that extends below the top of the arrow rest **63**. At the free end and on opposite sides of portion **95** triangularly shaped parallel flanges **105** (FIG. **6**) are formed in member **93** which act with the flanges **97** to define a pair of substantially V-shaped notches **107** (one at the front and one at the rear of the member **93**). The follow-up arrow **A2** fits in notches **107** and is tightly held at two points along its axis by the edges of the notches against the face **59** of plate **57** and against the top of arrow rest **63**. The holder **93** thus acts as a stabilizer for follow-up arrow **A2** to firmly maintain it in a desired pre-shooting position of alignment and parallel to arrow **A1** and the shooting position.

The arrow holding and stabilizing member **93** is manually latched in the operative, arrow holding and stabilizing position of FIGS. **1–5** and automatically released from the latched position when the follow-up arrow **A2** is moved by the carriage **51** into the plane of the bow, i.e., into shooting position, and is pulled back by the archer and nocked on the bow string. The holder member **93** is resiliently urged to a release position (FIG. **6**) by a spring wire **109** that is wrapped around pivot pin **99** between journal flanges **101** and has one end anchored by a threaded pin and nut **110** in the right side of wall **57** (FIG. **5**) and its other end pressed upwardly against and held by nut and screw **111** on portion **95** of the member **93**. The latch means to hold the holder member **93** in arrow holding position includes a rigid latch lip **113** on the holder member **93** adjacent the free end **103**. The latch means also includes a horizontal latch and clamp plate **115** that pivots off center about a vertical pin **117** and can be manually pivoted against spring resistance over the lip **113** thereby latching the member **93** against clockwise pivoting on its horizontal pivot **99** under the influence of spring wire **109**.

The latch and clamp plate **115** is mounted on the horizontal top flange **119** of an inverted substantially L-shaped latch and clamp plate support post **121** which has a leg **123** that is rigidly secured (as by welding) to the horizontal flange **57***a* at the bottom of wall **57** (and **57'**). While other arrangements are feasible, for compactness (compactness of the stations resulting in minimum movement to bring a follow-up arrow from a pre-shooting to a shooting position) the flange **119** of support **121** preferably extends toward the left of the archer and the leg **123** is preferably inclined back toward the archer as illustrated in FIG. **7**. The latch and clamp plate is pivotally secured to post **121** by means of a nut **125** that is threaded on the end of pivot pin **117** which is rigidly attached to flange **119**, there being a space **126** (which may be inside of a spacer sleeve as shown in FIGS. **11–12**) to permit passage of elastic cord **133** (FIGS. **4** and **6**).

The latch and clamp plate **115** has a rigid vertical clamp post **127** at one edge which also serves as a handle whereby it can be manually pivoted (against spring resistance to be described) on pin **117** to the latching and clamping position (FIGS. **3** and **5**) wherein it overlies the latch lip **113** on holder **93**. When the latch and clamp plate **115** is in the latching and clamping position, all of it is normally spaced ahead of the front of a vertical arrow holder retention wall **129** that is at the rear of rail **37** and welded or otherwise rigidly attached to it and/or to shelf **31***a*, thereby making it rigid with the track means **35**. The retention wall **129** serves as a barrier that holds the latch and clamp plate **115** in a latched position on lip **113** and therefore holds the holder **93** in an arrow holding position should the normal clamp force between the follow-up arrow and the clamp member **93** be accidentally reduced or lost. The right vertical end edge **131** of wall **129** is located in a selected position that will prevent premature release of the follow-up arrow.

The spring force urging the latch and clamp plate **115** to release the holder member **93** is provided by an elastic cord **133** which has one end anchored on the bottom of post **127** as indicated at **135** and the other end securely held in a slot **137** at the top of vertical spring anchor post **139** which is rigidly attached to bottom flange **57***a* of vertical plate **57**. When the latch and clamp plate **115** is moved manually from the unlatched position (FIG. **6**) to the latching and clamping position (FIG. **3** or FIG. **10**) the elastic cord **133** is stretched (being shown as extending around vertical pivot pin **117** in space **126** so the pull-back force goes over-center) and stores energy.

As seen best in FIG. **5** in conjunction with FIG. **3**, the vertical post **127** on the latch and clamp plate **115** is in engagement with the left side of the follow-up arrow **A2** when the plate is in the operative, latching position overlying lip **113**. The post is round in cross section (a round cylinder) and its point of contact with the arrow **A2** is close to, but not quite, overcenter with respect to the vertical pivot axis of plate **115** on pivot **117**. The "on-center" position of the post **127** occurs when its point of contact with an arrow and the axis of pivot pin **117** define a line which is perpendicular to the shaft or axis of an arrow **A2** that is properly supported against face **59** of vertical wall **57**. The diameter of post **127** is selected (or adjusted by means of an outer sleeve, not shown) so that the width of the space for an arrow between the face **59** and the point of arrow contact with the post **127** is slightly less than the arrow diameter when the post is in the on-center position. Thus, when an arrow **A2** is actually in place, the post **127** cannot be readily forced to go forward beyond the on-center position. However, it can be forced against the side of arrow **A2** and this presses the arrow into the soft facing **59** with sufficient force to clamp the arrow against the wall **57**. The post **127** can therefore be used to manually clamp or wedge the follow-up arrow **A2** in the desired position and the friction associated with the clamping force is sufficient to exceed the force in elastic cord **133** tending to pivot latch **115** to an unlatched position. If an external force is accidentally applied to follow-up arrow **A2** that is sufficient to overcome the friction clamp, the arrow is still held in the proper position by the holder **93** until the latch and clamp plate **115** is allowed by wall **129** to pivot away from holder lip **113**.

A spring motor means **141** is used to move the carriage **51** to the right in the track means **35**. The spring means stores energy when the carriage is manually moved to the left to the loaded position. As illustrated, the means **141** is also preferably in the form of an elastic cord **143** of one or more strands which is stretched between a fixed anchor on the track means (or other non-movable part such as riser **5**) and an anchor on the

carriage **51** and is long enough to supply the required energy at the required rate. The fixed anchor **145** is shown on the bottom of shelf **31***a* near the left end of the track means while the support post **121** can conveniently be used as the carriage anchor. The cord **143** is stretched from its anchor **145** at the left end of the track means along the bottom of the shelf **31***a* to a pulley **147** that is pivotally mounted at an angle on a rearwardly extending rigid bracket **149** at the right end of the track means. The cord **143** is trained around the pulley to reverse direction so that it extends leftwardly over the top of the track means **35** and traveler plate member **53** to reach its anchor at post **121**. The elastic cord is stretched as the carriage **51** moves to the left, away from the pulley **147**, and therefore continuously applies force to the carriage at post **121** urging it to move back to the right.

A stop and station positioning means **151** is provided to control and properly align the transverse positions of the carriage **51** on the track means **35**, i.e., with respect to the plane of the bow so that initial and follow-up arrows are positioned in the shooting position with their centerlines coaxial with the centerline of the bow. The stop and positioning means includes a vertical bracket **153** that is rigidly attached to the self **31***a*, i.e., to the track means **35**. At the top and on the left side, the bracket **153** is spaced above and extends over the top of front rail **39** and has a stop member **155** that is preferably removably attached to the bracket as by a recessed screw **157** threading into an integral pad at the overhanging top **158** of the bracket. The left side of the stop member **155** is a vertical, flat stop and alignment face **159** that determines where the carriage **51** will be positioned. The stop member **155** can be easily removed and replaced by another which is thicker or thinner in order to provide for transverse adjustment of the carriage stop to suit the diameters of the arrows being used and obtain the desired alignment of the arrow with the bowstring or the centerline of the bow, i.e., to place the arrows in the correct shooting position for the bow. Shims or other stop position adjustment means can be used if desired. Shims can also be used behind the Velcro faces **59** to adjust for the use of smaller arrows.

The stop face **159** is located in transverse alignment with the arrow rests **61** and **63** when the latter are in their elevated, functional, arrow supporting, positions. The right ends of the arrow rests will therefore butt against the stop face and act as stop members. Since the arrow rests are a part of the carriage **51** and the stop face **159** is a part of the track means **35**, such abutment will prevent movement of the carriage **51** to the right under the influence of the spring motor **141**.

As described above, the arrow rest members **61** and **63** are movable downwardly from their stop face engaging positions just described, such downward movement being caused by radial projections (such as vanes, fletching, feathers, or other device of sufficient stiffness) on a released arrow riding across the member. Such downward movement of a member **61** (for the initial or first arrow **A1**) that is in abutment with the stop face **159** causes it to lose contact with the stop face and go below the overhang portion **158** of the bracket **153**. This removes the obstruction to movement of the carriage **51** by the spring motor **141**. It therefore serves as a trigger that releases the carriage so that it is indexed to the right until arrow rest **63** comes into contact with the stop face **159**. This brings follow-up arrow **A2** still held by member **93** into the shooting position in the plane of the bow, ready to be grasped and nocked, thereby unlatching the holder member **93**, so that the arrow **A2** can be drawn, aimed, and released by the archer.

In order to positively prevent the spring motor **141** from pulling the carriage **51** out of the track means **35**, the vertical plate **57** at the left end of the carriage, i.e., the last plate or station to reach the stop face **159**, has a transverse arm portion **161** in alignment with the face **159**. This will abut against the stop face when the last station reaches the plane of the bow. This abutment will therefore serve to hold the carriage **51** in the track means until it is manually moved to the left against resistance of the elastic cord **143**. Intermediate vertical walls **57'** for intermediate stations (and the first wall **55**) do not have transverse arm portions **161**. If for production reasons, the walls **55** and **57'** have arms, they are bent parallel to the track means **35** as seen at **161A** (FIGS. **7–10**) and miss the stop face **159**. The vertical plates **57** and **57'** also have rearwardly extending transverse arms **162** which are aligned with posts **127** and provide a back-up to pressure applied to the follow-up arrows **A2**, **A3**, etc. by the post **127** to prevent canting of the arrows due to the clamping load. The arms **161** and **162** have facing **59** and are vertically aligned with the arrow (FIG. **6**) to increase the length of contact between arrow and plate. It will be noted in FIGS. **2**, **4**, **6** (and FIGS. **9–10**) that the arms **161** and **161A** lie over the right ends of arrow rests **61** and **63** and limit their upward movement, i.e., define their arrow supporting positions. To facilitate leftward movement of the carriage, the bracket **153** has an inclined wall or cam surface **163** that engages the left end of each arrow rest to cam it down below overhang **158**. (See FIGS. **2**, **9**, and **10**).

Manually operated stop means **165** (FIGS. **2–4**) can be selectively operated as desired to obstruct rightward or operative movement of the carriage **51**. This includes a vertically disposed lever **167** that is pivoted on a horizontal axis by threaded pivot pin **169** which is mounted in two walls of a bifurcated bracket **170** that is rigidly secured on the front of vertical stop bracket **153**. The pivot pin **169** is preferably a screw and nut assembly that extends through a hole in the lever and applies pressure to the lever so that the tightness of the screw and nut adjusts and controls the ease of pivotal movement of the lever by increasing or decreasing frictional resistance to pivotal movement. The top of the lever **167** is in the form of a flat stop face portion **171** that can be positioned to lie about 1/16 inch under overhang **158** and just to the right of face **159** in the path of movement of the arrow rests **61** and **63** when they are in the lowered position wherein they would pass beneath the overhang **158** of stop bracket **153**. Portion **171** would therefore stop the carriage **51** and prevent its indexing when an arrow is released. The lever **167** has a handle portion **173** shaped like a trigger at its bottom portion to provide means for the archer to use the forefinger of his left hand while holding the hand grip **13** of the bow **3** to operate the lever **167**. If he pulls the trigger **173** the top **171** is pivoted out of the path of the carriage **51**; and if he pushes the trigger the top **171** will move into the path of the arrow rests **61** and **63**. If desired, the lever **167** could be spring biased to return to the carriage blocking position, as by connecting an elastic cord (not shown) between the top **171** and bracket **153** so that it is stretched when the lever is pivoted to the release position.

An arrow stabilizer means **181** is preferably used to help the arrow holder and stabilizer **93** support follow-up arrows A2, etc., that are carried by the loader **1**. The means **181** comprises a bracket **183** that has a horizontal shelf **185** spaced in front of the loader (FIG. **4**) on a horizontal level with the tops of the arrow rests **61** and **63**. The shelf **185** preferably has a Velcro-type padding **187** corresponding to that on the arrow rests. The shelf **185** preferably angles forwardly and to the left (FIG. **3**) and extends far enough to the left to be able to allow for transverse adjustments of the positions of walls **57** or **57'** relative to wall **55** and to support all follow-up arrows carried by the loader (i.e., arrows A3, A4, etc., if more than two stations are used.) The shelf portion **185** is at the top and front end of the stabilizer bracket **183** and the latter has a downwardly and rearwardly extending strut portion **189** which is rigidly secured by screws, welding, or the like at its bottom portion **191** to the bottom of a flange **192** at the front of shelf **31***a*.

To review briefly, the arrow holding and loading device **1** is mounted on bow **3** by means of a support frame **23** which is integral with a track means **35**. A carriage **51** indexes horizontally at right angles to the plane of the bow on the track means. The carriage **51** has a plurality of arrow support stations. The first station is for the initial or first arrow A1 to be shot and is defined by the wall **55** and arrow rest **61**. The second station is for the follow-up arrow A2 and is defined by the wall **57** and arrow rest **63**. It is parallel to but transversely separated from the first station by a very short distance, preferably in the range of 1.0 to 1.5 inches or less. Since follow-up arrow A2 must be supported while initial arrow A1 is being aimed and shot and since it must be moved into the shooting position in the plane of the bow, the second (and subsequent) stations have a holding, stabilizing, and clamping means **91** for holding the follow-up arrow tightly on the carriage. Arrows in the second (and subsequent) stations are additionally stabilized, if desired, by resting on the shelf **185** of stabilizer means **181**. The device therefore contacts each follow-up arrow at several axially spaced points along its length to firmly hold it in a pre-shooting position parallel to the shooting position during movement of the bow and the vibration associated with release of an arrow.

A latch means including latch and clamp plate **115** is provided to latch each holder and stabilizer member **93** in operative position wherein the arrow is seated in V-shaped notches **107** which are preferably sized to provide pressure to clamp the arrow A2 against face **59** and wall **57**. Post **127** on latch and clamp plate **115** also applies enough clamp force to the arrow A2 to overcome spring means **133** which urges the latch and clamp plate **115** to release the arrow. The plate **115** is not permitted to move from latch lip **113** on holder **93** until the plate **115** passes by the edge **131** of latch holder wall **129** during rightward index movement of the carriage **51** and the friction force holding post **127** against the arrow A2 is overcome.

The carriage **51** is indexed automatically in its operative direction from left to right by the spring motor **141**. However, indexing cannot occur if the arrow rest **61** (or the arrow rest **63'**-FIGS. **9–10**) is in the up position because of abutment of the right end of the arrow rest with the stop face **159**. However, when an arrow is released, the movable arrow rest **61** (or arrow rest **63'**) is forced down by the vane, etc. on the arrow. This moves the arrow rest out of engagement with the stop face **159** and the carriage is then automatically indexed to the right (assuming stop means **165** is out of the way) until the next arrow rest **63** abuts against the stop face **159** thereby positioning the next arrow in the shooting position. Indexing can be prevented by manual operation of the finger actuated stop means **165** to place stop face **171** in the path of the depressed arrow rest.

FIGS. **1–7** refer to a loader **1** that is and adapted to carry two arrows, i.e., a two station loader for a first arrow and one follow-up arrow. However, as seen in FIG. **7**, the carriage traveler plate **53** may if necessary be lengthened and provided with extra pairs of openings **56** to receive screws **55***b* or **57***b*. Thus, a third vertical plate **57'** may be attached to the plate **53** as shown in FIG. **8**, plate **55** also being moved to a right-end position to provide for equal spacing of the plates **55**, **57'** and **57** and formation of a three station carriage **51'**. As seen in FIG. **6** the vertical plate **57** with its bottom flange or foot **57***a* serves to support all the mechanism for a follow-up station (movable arrow rest, arrow holding, stabilizing, and clamping means) and can be produced as an operative subassembly to be attached to different carriages or to different positions on a given carriage. The same is true of plate **57'** with its foot **57'***a* and attached parts like plate **57**.

The structure of FIG. **8** is used in the three station loader **1'** of FIGS. **9** and **10** wherein the reference numbers used in FIGS. **1–7** are used to describe the same structure in FIG. **8**. FIG. **9** shows the loader **1'** just after first or initial arrow A1 (not shown) has been released (arrow rest **61** is still somewhat depressed) and the carriage **51'** has indexed to the right until the arrow rest stop member **63'** for the second station has abutted stop face **159**. The archer has applied force to follow-up arrow A2 in the direction of reference arrow F (FIG. **9**) and this has broken the friction of the clamp grip between latch post **127** and arrow A2 to allow spring cord **133** to pivot latch plate **115** (not shown for clarity) so that it moves away from lip **113** allowing spring **109** to pivot the holder **93** up and out of the way of the first follow-up arrow A2. The parts remain in the position of FIG. **9** (except that arrow rest **61** will rise along surface **163** toward the bottom of arm **161**A) until the archer has released the follow-up arrow A2.

FIG. **10** shows the loader **1'** an instant after the archer has released the first follow-up arrow A2. The radial vane or fletching V2 has passed across arrow rest **63'** and depressed it below stop face **159** so that spring cord **143** has started to pull the carriage **51'** to the right. It will move to the right until arrow rest **63** for the third station abuts the stop face **159**. Assuming that latch post **127** hasn't been dislodged from its friction clamp against arrow A3, the second follow-up arrow A3 will remain in clamped position with holder **93** in the operative position shown in FIG. **10** until the archer applies force F to the arrow A3. Even though arrow A3 (the last arrow carried by the loader) is released, the carriage **51'** will index no further to the right because of contact of arm **161** with the stop face **159**.

After the last follow-up arrow A3 has been shot, the device may be reloaded. This is done when the station is in shooting position (i.e., to the right of the end **131** of wall **129**) and in reverse order (i.e., A3, A2, and A1) because of retention wall **129**. Thus, arrow A3 is clamped in position on wall **57**; the carriage is pushed to the left until member **63'** is cammed under overhang **158** whereupon arrow A2 is clamped in position on wall **57'**; the carriage is pushed again to the left until arrow rest

61 is cammed under overhang 158 whereupon the first arrow A1 is supported against wall 55 on rest 61 and in the shooting position for the bow.

It will be seen that the arrow holding and loading devices 1 and 1′ of FIGS. 1–10 can be used with a wide variety of bows to provide an archer with one or more fast follow-up shots using arrows A2, A3, etc. The stations for the respective arrows can be placed very close to each other so that the arrows are only an inch or so apart. The follow-up arrows are parallel to the first arrow A1 in the shooting position and need only be moved sideways by carriage 51 or 51′ for an inch or so to be delivered to the shooting position from the last pre-shooting position. This small movement minimizes visual disturbance of the environment. The various metal parts can be well lubricated and/or padded to minimize noise and auditory disturbance of the environment. Shooting of the first arrow A1 triggers automatic movement of carriage 51 or 51′ to deliver the first follow-up arrow to the shooting position, ready for nocking, drawing, aiming, and release by the archer. Similarly, shooting of the first follow-up arrow A2, triggers automatic delivery of the second follow-up arrow A3 to the shooting position, ready to be shot by the archer. This automatic delivery of each follow-up arrow, along with the small amount of sidewise movement of the arrow, enables the follow-up arrow to be nocked and shot very rapidly, especially if the special nock N of FIG. 10 (described hereinafter in connection with FIGS. 28–29) is used on the arrow. The device 1 or 1′ can enable the archer with experience to release follow-up arrow A2 within about two seconds after release of arrow A1. The fast, automatic delivery of the follow-up arrows A2, A3, etc. also improves accuracy because the archer's attention and movements can be focused almost exclusively on shooting. It is not necessary for him or her to search for and load the follow-up arrow.

The devices 1 and 1′ are sturdy and compact in construction, easy and quiet to use, operate rapidly and smoothly, and can be attached to most bows. They drastically reduce the amount of time between arrow releases. They deliver each of the follow-up arrows consistently to the same position so that the archer can have a smooth, economical, rhythmic, hand-arm motion in shooting. The benefits to the hunter are obvious. For sport archery, the speed of the devices can add another dimension to target shooting by making it possible to quickly and accurately shoot at moving and/or multiple targets.

FIGS. 11–18 show a modified loader 201 which has two stations and is very similar to loader 1. A two station loader is probably best for hunting and the construction 201 is intended to provide a compact device giving reliable performance at a somewhat lower cost of manufacture than loader 1, though the constructions are very similar.

The loader 201 has a support frame 203 (FIG. 12–14) which includes a plate 204 having a vertical flange 205 and a horizontal shelf 207, the flange 205 having a hole 209 whereby the frame may be bolted to the bow (not shown). A C-shaped channel 211 is secured by countersunk screws 213 (FIG. 13) to the top of the shelf 207 and provides front and rear tracks 215.

A carriage assembly 217 for two arrows A1 and A2 includes a traveler or carriage member 219 (FIGS. 15–16) that has a flat bottom plate section 221 that slidably fits on top of channel 211 and has its front and rear longitudinal edges 222 in tracks 215. The member 219 is formed from a flat blank (FIG. 16) and its reduced width right end (as seen by the right-handed archer) is bent at a right angle along line 223 to form a first station vertical wall 225. The blank has a reduced width and specially shaped left end (as seen by a right-handed archer) that is bent at a right angle along line 227 and again at a right angle along line 229 to form a vertical left end section 231 and a horizontal flange section 233 extending to the left from the top of vertical section 231. A second station vertical wall 235 (substantially similar to wall 57) has a horizontal foot flange 237 that is welded to the top of plate section 221 so that second station wall 235 is parallel to the first station wall 225 and spaced the desired distance from it.

As seen in FIG. 16, the wall 225 has three same size thread openings 239, 241, and 243 formed in it. After the blank is bent into member 219, an arrow rest pivot pin 245 is screwed into opening 239, an arrow rest stop pin 247 is screwed into opening 241, and a spring anchor pin 249 is screwed into opening 243. (These could be welded or press fit connections, if desired.) Wall 235 also has a pivot pin 245 and a spring anchor pin 249, but it does not need a stop pin corresponding to stop pin 247.

Two arrow rest levers 251 (one for wall 225 and the other for wall 235) are formed from blanks as shown in FIG. 17. Each has a base section 253 with a pivot pin receiving opening 255 (for pivot pin 245) and a threaded opening 257. The blank has reduced width section that is bent at a right angle along line 259 to form the arrow rest support arm 261. An arrow rest spring anchor pin 263 (FIG. 15) is threaded into opening 257.

A pair of axially separated nuts 265 are threaded on to each pivot pin 245, one of them engaging the base section 253 of each lever and the other serving to press the coiled center section 267 of an arrow rest return spring wire 269 which fits over the pin 245 against the first nut 265. One end of the spring 269 is looped around and anchored on pin 249 on the wall 225 or 235 and the other is looped around and anchored on the pin 263 on the lever 251. Sleeves 271 of "Velcro" material or the like (FIGS. 11 and 12) are mounted on the arms 261 to serve as the outer arrow rest surfaces for contact with arrows. The left faces of walls 225 and 235 are covered with similar material as indicated at 273 (FIG. 11).

The wall 235 has its top end centrally slotted at 275 to form two arms 277 that are curled around as shown in FIG. 15 to form a journal aperture 279. Located below the slot 275 and vertically aligned with it, the wall has a threaded opening to receive a threaded pin 281 (FIG. 15). The wall preferably has transverse arms 283 and 285 (FIG. 15) corresponding, respectively, to arms 161 and 162 (FIG. 7).

The wall 235 carries an arrow holder, stabilizer, and clamp means 287 corresponding to arrow holder, stabilizer, and clamp means 91. This includes an arrow holder and stabilizer member 289 which may be formed from the flat metal blank 289′ shown in FIG. 18. The blank has a generally rectangular body portion 291 and triangularly shaped side portions 293 each having a pivot pin opening 295 in it. The end opposite to portions 293 has a stubby flange or lip 297 which corresponds to latch lip 113 (FIG. 6). The side portions 293 are bent along lines 299 to extend at right angles to the body portion 291. The body portion 291 is bent at about a right angle along line 301, at the apex of triangular sections 293, to form pivot section 291*a* and latch section 291*b*. The sides 303 of triangular sections 293 act

with the inside of body portion **291***b* to form arrow holding notch portions **305** corresponding to notches **107** (FIGS. **6** and **9**).

The arrow holder and stabilizer member **289** is mounted on vertical plate **235** by aligning holes **295** with opposite ends of aperture **279** in journal arms **277**. A pivot pin **307** is inserted in the aligned holes and aperture and longitudinally secured in place as by a nut **309** threaded on one end and an enlarged head (not shown) at the other end. A spring wire **311** (FIG. **12**) corresponding to spring wire **109** (FIGS. **3** and **6**) urges the member **291** to the up or open position and has a center coil (not shown) around pin **307** in slot **275** and one end anchored by nut **313** on pin **281** (FIG. **15**) of vertical plate **235** and the other end (not shown) anchored around an anchor screw **315** (FIGS. **11** and **12**) threaded into hole **317** (FIG. **18**) of body portion **291***a*.

A latch means to hold the member **289** in arrow holding and stabilizing position is very similar to that previously shown and described. It includes a horizontal latch and clamp plate **319** that is pivoted at one end on vertical pin **321** (FIG. **15**) which is threaded into hole **322** (FIG. **16**) in horizontal flange section **233** of traveler member **219**. The plate **319** can be pivoted so that the other end will overlie the latch lip **297** on holder member **289** thereby latching the member against upward movement by the spring wire **311**. The latch and clamp plate **319** has a rigid vertical clamp post **323**, corresponding to post **127**, which serves as a handle to manually pivot the plate **319** to the latching and clamping position of FIG. **11** in which the plate overlies lip **297** and the post **323** presses the follow-up arrow A2 with clamping pressure against the face **273** (including arms **283** and **285**) of vertical plate **235**. The dimensions are arranged, as previously described, so that the post **323** holds the arrow A2 against tension in elastic cord **325** which is anchored at one end in a hole in the post **323**, extends around spacer sleeve **327** on pivot post **321**, and is anchored at its other end in a slot **329** in flange **233**. A nut **331** threaded on top of pivot pin **321** holds the sleeve **327** in place. The frame **203** includes a vertical barrier or retention wall **333**, corresponding to wall **129**, which will be engaged by the latch and clamp plate **319** to prevent inadvertent release of the arrow A2 should the normal clamp force be accidentally reduced or lost.

As seen in FIG. **14**, the barrier wall **333** may be a part of a flat metal blank **335** used to form the frame **203**. The blank is slotted at **337** to separate the barrier wall forming portion **333'** from the adjacent portion of the blank. Portion **333'** can then be bent at a right angle along line **339** to form the wall **333**. The blank **335** has a V-shaped cutout **341** to define the flange forming portion **205'** which is bent at a right angle along line **343** to form the vertical flange **205**. The remainder of the blank is roughly of a T-shape and forms the horizontal shelf **207**. However, adjacent the notch **341** is a small extension **345'** with a slot **347**. This is bent up at an angle of about 70 degrees along line **349** to form a vertically extending wall **345** (FIG. **11**) that serves as an anchor for one end of the elastic cord spring means to be described. Three pairs of threaded holes **351** are formed in the blank and these receive the countersunk screws **213** (FIG. **13**).

A bracket **353** to form a carriage stop and station alignment means has a bottom flange **355** that may be welded to the bottom of the front of the shelf **207** section of the blank **335**. The bracket **353** includes a vertical post section **356** (FIG. **13**) that has a transverse flange extending over the track **215** to form a stop face flange **357** with a stop face pad **359**, corresponding to stop face **159**, secured to it. The thickness of pad **359** may be varied to suit the application and provide clearance for level **251** on plate **225**. To contact the pad **359**, a non-metallic pad **361** may be secured to arm **283** of vertical plate **235**.

An arrow stabilizer bracket **363** (corresponding to stabilizer means **181**) has a bottom flange **365** with two pairs of threaded openings that register with opening **351** in the shelf **207** whereby two pairs of screws **213** that secure the track channel **211** to the shelf may also be used to secure the bracket **363** to the shelf. The bracket extends upwardly to a top horizontal shelf **367** with a Velcro-type facing **369** that is located on a level with the top of the second arrow rest sleeve **271** to help support and stabilize arrow A2 (FIG. **11**).

When the carriage **217** is assembled on the frame **203**, the elastic cord **371** is used to provide a spring means that is energized when the carriage is moved to the loaded position of FIG. **11**, thereby providing force to automatically move the carriage to the right when the first arrow rest **271** is depressed upon release of first arrow A1. The cord **371** is knotted at its left end and slipped through opening **373** (FIG. **16**) in vertical wall **231** of traveler **219**. The right end of the cord **371** is then knotted at the appropriate length and the cord slipped into slot **347** of cord anchor wall **345** on the frame **203**. The angle of the wall **345** traps the knotted end of the cord **371** to resist any tendency to slip up and out of the slot **347**.

The operation of the device **201** of FIGS. **11–18** is substantially the same as that of device **1** and therefore need not be explained. It should be noted that the structural features shown in FIGS. **11–18** promote economy in manufacture without sacrifice in performance or ease of operation.

Referring to FIGS. **19** and **20**, a simplified form of two station arrow loader **401** is illustrated that omits several features present in the loaders **1**, **1'**, and **201** but is less costly to manufacture. The loader **401** has a support frame **403**, similar to the previous frames, which includes a plate **404** vertical flange **405** and a horizontal shelf **407**, the flange **405** having a hole **409** to receive bolt **411** for attaching the frame and loader to the bow **413**. A C-shaped channel **415** is secured to the top of the shelf **407** and provides front and rear tracks **417**. The shelf **407** and the channel **415** each have a large rectangular opening and these are vertically aligned to provide a large opening **419**. The frame **403** also has a vertical post **421** affixed to the front of shelf **407** which has a vertical stop face **423** corresponding to stop faces **159** and **359**.

A carriage assembly **425** for initial and follow-up arrow A1 and A2 includes a bottom plate **427** having front and rear longitudinal edges which slide in the tracks **417**. The right end of the plate is bent up into a vertical wall **429** for the first station (initial arrow A1). A second vertical wall **431** for the second station (follow-up arrow A2) is affixed to the other end of the plate **427**. It has an arm **432** (corresponding to arms **161** and **283**) that is engageable with stop face **423** to locate the follow-up arrow A2 in the shooting position.

The arrow rest **433** for the arrow A1 comprises a substantially horizontal pin **435** which is rigid with one end of a lever **437**, the other end of the lever **437** being pivoted by pin **439** to the left side of the wall **429**.

The arrow rest and arrow holder **441** for the arrow A2 comprises a flexible trough **443** formed of elastic sheet material having a curved shape as shown in FIG. **20**. One edge of the trough **443** is securely attached to the left face of the vertical wall **431** as indicated by pins **445**. A holder lever **447** in opening **419** is connected by centrally located pivot pin **449** to the wall **431** and when in its vertical and operative position (FIG. **19**) has a top portion **451** shaped to bend the left edge **453** of the flexible trough **443** into an arrow holding, stabilizing, and clamping position around the arrow A2 as shown in FIG. **19**. It has a bottom portion **454** that extends down through opening **419** below the bottom of the frame **403** where it is accessible to and operable by a finger of the left hand of the archer. If the archer pulls on the portion **454**, the top portion **451** will move from the operative position of FIG. **19** to the inoperative position of FIG. **20**. In this position, the expanded trough serves as an arrow rest for the follow-up arrow A2 which can be shot when the trough is brought by carriage **425** into the shooting position.

As in previous embodiments, the carriage assembly **425** is automatically moved to the right, after initial arrow A1 is released, by tension in an elastic rod **455**. The left end of cord **455** has a knot **457** that engages the left side of wall **431** while the cord passes through a hole (not shown) in wall **431**. At the right end of the frame the cord extends through a slot **459** in the right end of the rear track of the channel **415**. A knot **461** in the right end of the cord engages the bottom of the channel (FIG. **20**) to hold the cord in place. As in previous embodiments, only a very small amount of sideways movement is needed to bring the follow-up arrow into shooting position. The spacing of the stations and arrows can be very small (less than previous embodiments because the latch mechanism is not used) and determined primarily by the fletching of the arrows.

Contrary to the previous embodiments, the follow-up arrow is manually released from the arrow holding, stabilizing, and clamping mechanism **441**. When the follow-up arrow A2 reaches the shooting position (FIG. **2**), the archer can use a finger of his left hand to pull back on the bottom of lever **447** thereby placing arrow A2 in shooting condition.

Contrary to the previous embodiments, the device **401** illustrates a last station (for arrow A2) that does not have a movable arrow rest capable of acting as a switch to actuate movement of the carriage. In devices **1**, **1'**, **201**, and **401** it is not necessary for the last station to have a movable arrow rest though the movable arrow rest is preferable to minimize deflection of the arrows.

FIGS. **21–23** show another form of loader **501**. This loader has many of the same structural features as loader **401**. These are given the same reference numbers in FIGS. **21–23** but with **100** added. Parts are omitted in FIG. **22** for clarity. The difference between loaders **401** and **501** is in the arrow rest, holding, stabilizing, and clamping means **571** at the second station for follow-up arrow A2.

The vertical plate **531'** for the arrow A2 is shorter than its counterpart plate **431** but does have an arm **532** (corresponding to arm **432**) that is engageable with stop face **523** to align the second station with the shooting position. The arrow rest, holding, stabilizing, and clamping means **571** is formed of elastic sheet material and has a bottom partially circular (more than 180 degrees) arrow holding, stabilizing, and clamping section **573** with diverging top sides **575** that are spaced apart by less than the diameter of the arrow and define a triangularly or V-shaped arrow rest section **577**. The arrow rest is located on the center line of the bow and in the shooting position when the arm **252** is in contact with face **523**. The holder **571** may be formed of two halves with flat bottom flanges **579** in face to face contact and secured as by pins or screws **581** to the vertical wall **531'**.

As in previous embodiments, the follow-up arrow A2 is automatically moved sideways into the plane of the bow when initial arrow A1 is shot. Contrary to previous embodiments, it then must be manually angled by the archer out of the grip of section **573** until it rests on sides **575** where it is then on the center line of the bow, or shooting position, and ready to be shot.

FIGS. **24** and **25** illustrate still another form of loader **601**. This loader, like loader **501**, has many of the structural features of loader **401**. These are given the same reference numbers in FIGS. **24** and **25** as in FIGS. **19** and **20** but with **200** added. The difference between loader **601** and loaders **401** and **501** is in the arrow rest, holding, stabilizing, and clamping means **671** at the second station for the follow-up arrow A2.

The means **671** includes a fixed arrow rest pin **673** rigidly secured to the vertical wall **631** and projecting to the left and angled upwardly away from the archer. It supports the follow-up arrow A2 in shooting position when stop member arm **632** engages top face **623**. The means **671** also includes identical and aligned front and rear arrow holders and clamps **675** which act together to help hold, clamp, and stabilize arrow A2 while it is in a pre-shooting position. Each holder **675** has a resilient C-shaped arrow receiver member **677** sized to tightly but releasably embrace the arrow A2. Each receiver member **677** is secured by a hinge member **679** to the left side of wall **631** for pivotal movement between the operative position of FIG. **24** (in which it extends perpendicularly to the wall **631**) and the inoperative position of FIG. **25** (in which it lies against and parallel to the wall **631**). A coil spring **681** on the hinge pin acts between the hinge and the receiver **677** to urge the receiver to the inoperative position of FIG. **25**.

As in previous embodiment, the follow-up arrow A2 is automatically moved sideways into shooting position by carriage **625** when first arrow A1 is shot. Contrary to previous embodiments (except **501**), it then must be manually extracted by the archer from receiver members **677**. These then go against the wall **631** and arrow A2 is supported in shooting position on arrow rest **673**.

FIGS. **26** and **27** illustrate a holder **701** having a carriage that is indexed to the right by the archer instead of by a spring means. The frame of loader **701** has many structural features of holder **401**. These are given the same reference numbers but with **300** added. However, the stop post **721** of frame **703** is somewhat different from stop post **421**. Post **721** is shorter and has a magnetic block **722** attached by screw **722*a*** on top of it. The block **722** has a stop face **723**.

The carriage means **725** has a bottom plate **727** with front and rear edges that slide in tracks **717**. A first vertical plate **729** providing the first station for arrow A1 (omitted in these Figures for clarity) and a second vertical plate **731** providing the second station for follow-up arrow A2 are rigid with the plate **727**. Plate **731** has a transverse stop arm **732** that is in alignment with magnetic block **722** and stop face **723**. If plate **731** is made of steel, it will be magnetically held against stop face **723**. If the plate **731** is made of non-magnetic mate-

rial, a pad (not shown) capable of being magnetically held by magnet **722** should be attached to the right side of arm **732**. The first vertical plate has an arrow rest **733** in the form of an upwardly inclined pin **735** (corresponding to pin **673** of FIGS. **24** and **25**). For clarity, the arrow rest and holder means for arrow A2 is omitted, but it could, for example, be like the means **571** in FIGS. **21** and **22** or the means **671** in FIGS. **24** and **25**.

In accordance with this form of the invention, the bottom plate **727** is extended for some distance to the right of first vertical plate **729** as shown in **789**. At the right end of extended bottom plate portion **789** is an upwardly extending vertical handle flange **791**. The inside face of the flange **791** may be engaged by the right thumb or other finger of the archer to apply force to the carriage to move it to the right from the arrow **A1** shooting position of FIG. **26** to the arrow A2 shooting position of FIG. **27**.

Suitable means are provided to yieldably hold the carriage **725** in the position of FIG. **26**. This is illustrated as a dimple means **793** comprising a pair of upwardly extending dimples **795** in the floor of frame channel **715** and a pair of corresponding dimple receiving recesses **797** in the bottom of plate **727**. When manual pressure to the right is applied to flange **791** by the archer, the carriage **725** will move out of the dimple means **793** until arm **732** engages stop face **723**. This is the shooting position for follow-up arrow **A2**. The magnetic block **722** holds the carriage in position for shooting of arrow **A2** while the dimple-means holds the carriage in position (FIG. **26**) for shooting of the first arrow (**A1**—not shown).

FIGS. **28–19** illustrate a special nock **801** that I prefer to use with the automatic forms of my invention. (The nock of these Figs. is also shown at N in FIGS. **1, 2** and **10**). A rear portion of a follow-up arrow **A2** is shown having the nock **801** at the end ready for nocking on bow string **11** by the right hand H of the archer. The nock **801** has the usual bow string groove **803**. The arrow has the cock vane **805** at a right angle to the groove **803** and then hen vanes **807** spaced 120 degrees from it as is conventional. According to the invention, the nock wall **809** on the right side of groove **803** is very short. Thus, the inside face **811** of the normal left wall **813** (on a follow-up arrow **A2**, **A3**, etc., that is placed in the loader so that face **811** is transversely aligned with string **11**) will be laid up against the bow string **11** by the loader of the invention when the follow-up arrow is automatically brought into shooting position. This is shown in FIG. **28**. FIG. **29** illustrates the short pull required to achieve nocking.

As a further feature to facilitate drawing, the nock **801** has a knob **815** on top. FIG. **29** shows how this will assist the archer in pulling the arrow **A2**.

The various arrow holding and loading devices that have been illustrated and described in the preceding description show that my invention may be embodied in different specific forms. The forms described all utilize a straight horizontal feed path, perpendicular to the plane of the bow, in which one or more securely held follow-up arrows are moved sideways or transversely to their lengths by automatic or manual means for pre-shooting positions into the shooting position. At the present time I believe that this type of feed path is preferred. However, it is within the broad purview of the invention to feed the follow-up arrows sideways on an inclined path or an arcuate path to the shooting position. It will be appreciated that these and other modifications of the constructions that are illustrated and described are within the broad spirit and scope of the invention.

I claim:

1. An arrow loader for an archery bow, said bow having a shooting position, said arrow loader comprising means for supporting a first arrow on said bow in said shooting position, means including an arrow rest for supporting a follow-up arrow on said bow in a pre-shooting position parallel to a first arrow in the shooting position, and means for moving the arrow rest and follow-up arrow transversely to its length into the shooting position wherein the arrow is aligned and ready for nocking, drawing, aiming and release by the archer.

2. An arrow loader for an archery bow, said bow having a shooting position for an arrow, said arrow loader comprising a carriage, means for supporting the carriage on the bow for movement relative to said shooting position, means for supporting a first arrow on the carriage, means for supporting a follow-up arrow on the carriage, means for moving the carriage so that the first arrow is in said shooting position, and means actuated by contact with the first arrow during shooting of the first arrow for moving the carriage so that the follow-up arrow is in the shooting position.

3. An arrow holding and loading device for an archery bow having a shooting position for an arrow wherein the arrow is in appropriate alignment for nocking on the bowstring and drawing, aiming, and release by the archer, said device comprising a carriage having first means for holding a follow-up arrow in a pre-shooting position wherein said arrow is substantially parallel to but transversely separated from an arrow in said shooting position, second means for supporting the carriage on the bow to provide for transverse movement of the carriage to move said follow-up arrow from said transversely separated pre-shooting position into said shooting position, and third means for the application of force to transversely move said carriage so that said arrow moves from said pre-shooting position to said shooting position.

4. An arrow holder and loader for an archery bow having a shooting position for an arrow, said arrow holder and loader comprising a frame, a carriage movable mounted on the frame for linear movement transverse to said shooting position for an arrow, said carriage including means for supporting an arrow in a pre-shooting position substantially parallel to but transversely spaced from said shooting position for an arrow, and means for indexing the carriage to bring said arrow substantially into said shooting position.

5. An arrow loader as set forth in claim **4** wherein said frame includes means for rigidly securing it to the bow.

6. An arrow loader as set forth in claim **4** wherein said frame includes a track means defining a horizontal linear track transverse to said shooting position for an arrow, said carriage being mounted on said track for horizontal linear movement transverse to said shooting position of an arrow.

7. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first station including an arrow rest for supporting a first arrow so that it is ready to be shot, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first station in said

shooting position and in a second position wherein said second arrow is supported by said second station in said shooting position, and carriage moving means for moving said carriage from said first position to said second position.

8. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position.

9. A device as set forth in claim **8** wherein said carriage moving means comprises a spring means.

10. A device as set forth in claim **9** wherein said first means includes a movable member capable of being moved by the first arrow when the first arrow is shot, connecting means operatively connecting said movable member to said mechanical means whereby said carriage is released from said first position by movement of the movable member and is moved by said spring means to said second position.

11. A device as set forth in claim **10** including a movable stop face member mounted on said frame and adapted to be moved to an operative position wherein it blocks movement of the carriage and holds the carriage in the first and second positions, said member being manually operated by the archer.

12. A device as set forth in claim **8** wherein said second means includes releasable means for holding said follow-up arrow in said pre-shooting position and arrow rest means for supporting said follow-up arrow in said shooting position wherein said arrow is aligned and ready for nocking, drawing, aiming, and release by the archer.

13. A device as set forth in claim **12** wherein said releasable means is operated to release by predetermined movement of said follow-up arrows.

14. A device as set forth in claim **13** wherein said predetermined movement is axial and comprises drawing of the follow-up arrow for nocking by the archer.

15. A device as set forth in claim **12** wherein said releasable means is adapted to engage said follow-up arrow at a plurality of axially separated points along its length whereby to firmly hold it in its pre-shooting position.

16. A device as set forth in claim **8** wherein said mechanical means includes a stop face member mounted on said frame and a stop member mounted on the carriage and engageable with the stop face member, said stop member being yieldably urged into engagement with the stop face member and movable out of engagement with the stop face member to allow movement of said carriage.

17. A device as set forth in claim **16** including means mounting the stop member on the carriage so that contact with an arrow upon shooting of the arrow moves the stop member out of engagement with the stop face member.

18. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot to that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said spring means comprising an elongated elastic cord having a length greater than the length of the carriage.

19. A device as set forth in claim **18** wherein said carriage includes a one piece member having a base portion adapted to movably engage said frame, said member having a first flange at one end extending at a right angle to said base portion and comprising a portion of said first means, said one piece member having a second flange at its other end extending at a right angle to said base portion, said elastic cord being anchored at one of its ends to said second flange.

20. A device as set forth in claim **19** wherein said second flange includes a top portion extending at a right angle so that it is substantially parallel to said base portion and extending away from the first flange, said second means including a clamp member pivotally mounted on said top portion.

21. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said carriage moving means comprising handle means on the carriage to receive transverse force applied by a hand of the archer.

22. A device as set forth in claim **21** wherein said mechanical means includes dimple means for yieldably positioning and holding the carriage in the first position and magnetic stop face means for yieldably positioning and holding the carriage in the second position.

23. An arrow holding and loading device for an archery bow, said bow having a shoorint position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage

having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said carriage moving means comprising spring means, said first means including a movable member capable of being moved by the first arrow when the first arrow is shot, connecting means operatively connecting said movable member to said mechanical means whereby said carriage is released from said first position by movement of the movable member and is moved by said spring means to said second position, said movable member comprising an arrow rest for supporting said first arrow in said shooting position.

24. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said second means including releasable means for holding said follow-up arrow in said pre-shooting position and arrow rest means for supporting said follow-up arrow in said shooting position, said releasable means being operated by predetermined movement of said follow-up arrow, said predetermined movement being non-axial and comprising sidewise movement of the arrow by the archer.

25. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said second means including releasable means for holding said follow-up arrow in said pre-shooting position and arrow rest means for supporting aid follow-up arrow in said shooting position, said releasable means including an elastic member and a lever means for biasing the elastic member to a position around a portion of the follow-up arrow, said lever means including a portion operated by the archer to move the lever means so that it allows the elastic member to move from said position around a portion of the follow-up arrow, said elastic member also serving as said arrow rest means.

26. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said second means including releasable means for holding said follow-up arrow in said pre-shooting position and arrow rest means for supporting said follow-up arrow in said shooting position, said second means including a vertical wall on said carriage, said releasable means being mounted on said vertical wall.

27. A device as set forth in claim **26** wherein said arrow rest means is mounted on said vertical wall.

28. A device as set forth in claim **27** wherein said releasable means comprises a pair of C-shaped arrow gripping members mounted on said wall above said arrow rest means and adapted to yieldably embrace and hold said follow-up arrow, said gripping members being hinged to said vertical wall and spring biased to an inoperative position flat against the wall.

29. A device as set forth in claim **26** wherein said releasable means comprises a pair of resilient members at the top of said vertical wall defining a cylindrical trough having resilient walls and an opening on top to receive said follow-up arrow, said opening being of less width than the diameter of the follow-up arrow, said trough having a diameter substantially the same as said arrow, said resilient members having top portions extending outwardly from opposite sides of said opening to form a substantially V-shaped support for said follow-up arrow, said support providing said arrow rest means.

30. A device as set forth in claim **26** wherein said releasable means includes a movable clamp member for applying transverse force to said follow-up arrow and clamping it against said vertical wall.

31. A device as set forth in claim **30** wherein said clamp member is constructed and arranged to be moved away from said follow-up arrow upon axial movement of said arrow toward the archer and thereby remove said transverse clamping force on said arrow.

32. A device as set forth in claim **31** including spring means urging said clamp member to move away from said follow-up arrow.

33. A device as set forth in claim **32** wherein said spring means comprises an elongated elastic cord connected at one end to the clamping member and at the other end to said carriage.

34. A device as set forth in claim **33** including an arrow holder and stabilizer member movably mounted on said vertical wall and adapted in a closed and operative position to embrace said follow-up arrow and hold

it against said wall, said arrow holder and stabilizer member being yieldably biased to an open and inoperative position out of the way of axial movement of the follow-up arrow, and movable latch means engageable with said arrow holder and stabilizer member for latching it in said closed and operative position.

35. A device as set forth in claim **34** including retention means on the frame and engageable with the latch means to prevent unlatching movement thereof until the carriage has moved substantially to said second position.

36. A device as set forth in claim **35** wherein said latch means and said clamp member are connected to move together.

37. A device as set forth in claim **35** wherein said frame comprises a one piece member having a horizontal shelf portion and a flange extending at a right angle to the shelf portion and adapted to be secured to the bow, said one piece member having a wall extending at a right angle to the shelf portion and providing said retention means, said one piece member having an end flange extending at an angle to said shelf portion and containing a slot, said carriage being movably mounted on said shelf portion, said carriage means comprising an elastic cord connected at one end to said carriage and at its other end fitting in said slot and being connected to said end flange.

38. A device as set forth in claim **35** wherein said latch means includes said clamp member.

39. A device as set forth in claim **38** wherein said latch means includes a latch ear on said arrow holder and stabilizer member and a latch plate movable over the ear to hold the member in closed position.

40. A device as set forth in claim **39** wherein said clamp member comprises a vertical post on said latch plate.

41. A device as set forth in claim **40** wherein said arrow holder and stabilizer member is pivotally mounted on a horizontal axis to the top of said vertical wall and said latch plate is pivotally mounted on a vertical axis spaced horizontally from said wall.

42. A device as set forth in claim **26** including an arrow holder and stabilizer member movably mounted on said vertical wall and adapted in a closed and operative position to embrace said follow-up arrow and hold it against said wall, said arrow holder and stabilizer member being yieldably biased to an open and inoperative position out of the way of axial movement of the follow-up arrow, and movable latch means engageable with said arrow holder and stabilizer member for latching it in said closed and operative position.

43. A device as set forth in claim **42** wherein said first means includes a vertical wall on said carriage and an arrow rest for the first arrow mounted on said wall.

44. A device as set forth in claim **43** including movable means mounting said first means arrow rest on said first means wall so that engagement of the arrow rest by a radially projecting portion of the first arrow during shooting of the first arrow moves the arrow rest, said movable means being operatively connected to said mechanical means whereby said carriage is released from said first position by movement of the arrow rest during shooting of the first arrow.

45. A device as set forth in claim **44** wherein said second means includes movable means mounting said second means arrow rest means on said second means vertical wall so that engagement of the arrow rest means by a radial projection on the follow-up arrow during shooting of the follow-up arrow moves the arrow rest means, said second means movable being operatively connected to said mechanical means whereby said carriage is released from said second position by movement of the arrow rest means during shooting of the follow-up arrow, said carriage having a third means for supporting a second follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow and the follow-up arrow supported by the first and second means respectively, said mechanical means positioning said carriage in a third position wherein said second follow-up arrow is supported by said third means in said shooting position.

46. A device as set forth in claim **26** wherein said first means includes a vertical wall on said carriage and an arrow rest for the first arrow mounted on said wall.

47. A device as set forth in claim **46** including movable means mounting said first means arrow rest on said first means wall so that engagement of the arrow rest by a radial projection on the first arrow during shooting of the first arrow moves the arrow rest, said movable means being operatively connected to said mechanical means whereby said carriage is released from said first position by movement of the arrow rest during shooting of the first arrow.

48. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, carriage moving means for moving said carriage from said first position to said second position, said second means including releasable means for holding said follow-up arrow in said pre-shooting position and arrow rest means for supporting said follow-up arrow in said shooting position, and follow-up arrow stabilizer shelf means mounted on said frame and located in front of the carriage and providing a shelf to support the front end of a follow-up arrow held on the carriage in the pre-shooting position.

49. An arrow holding and loading device for an archery bow, said bow having a shooting position for an arrow, said device comprising a frame, a carriage mounted on the frame for movement toward and away from said shooting position, said carriage having a first means for supporting a first arrow to be shot so that said first arrow is in said shooting position, said carriage having a second means for supporting a follow-up arrow in a pre-shooting position wherein it is substantially parallel to the first arrow supported by the first means, mechanical means for positioning said carriage in a first position wherein said first arrow is supported by said first means in said shooting position and in a second position wherein said second arrow is supported by said second means in said shooting position, and carriage moving means for moving said carriage from said first position to said second position, said mechanical means including stop face member mounted on said

frame and a top member mounted on the carriage and engageable with the stop face member, said stop member being yieldably urged into engagement with the stop face member and movable out of engagement with the stop face member to allow movement of said carriage, means mounting the stop member on the carriage so that shooting of an arrow moves the stop member out of engagement with the stop face member, and cam means for moving the stop member out of engagement with the stop face member when the carriage is moved in a direction opposite to the operative direction wherein it brings a follow-up arrow up to the shooting position.

50. A device as set forth in claim **49** wherein said stop member comprises an arrow rest for supporting an arrow.

51. In an arrow loader for an archery bow having a bow string and a shooting position for an arrow, first means for holding a follow-up arrow in a pre-shooting position parallel to said shooting position and in the same horizontal plane as the shooting position and with the nock of the arrow substantially aligned transversely with the bow string, second means for moving the first means transversely in said horizontal plane so that the follow-up arrow is brought to said shooting position with the nock of the arrow substantially in contact with the bow string, and third means for releasably holding the second means in position when the follow-up arrow is in said shooting position.

52. The loader of claim **51** wherein said pre-shooting position is spaced from said shooting position by a distance of substantially 1 to 1½ inches.

53. An arrow nock for use on arrows that are to be loaded on to a bow by sideways movement of the arrow, said nock comprising a body having a groove for the bow string, said groove dividing the body into a leading side and a trailing side with respect to said sideways movement, said leading side being substantially shorter than the trailing side whereby the arrow may be moved sideways until the inside face of the trailing side comes into contact with the bow string.

54. A nock as set forth in claim **53** including a pull knob on the top of the nock.

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